5-3895-275-34

TM 5-3895-275-34

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

PAVING MACHINE, BITUMINOUS MATERIAL: GASOLINE ENGINE DRIVEN; CRAWLER MOUNTED; 8-TO 10-FEET WIDE (BARBER-GREENE MODEL SA-35) FSN 3895-057-8715

HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1974

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WARNING

DEATH OR SERIOUS INJURY

may result if personnel fail to observe safety precautions.

SAFETY PRECAUTIONS

BEFORE OPERATION

Before starting paving machine engine, be sure all controls and levers are in neutral position and master clutch disengaged.

Do not operate the engine in a closed building unless the exhaust gas is piped to outside. Exhaust gas is carbon monoxide, a colorless, odorless poisonous gas.

When using hand crank for starting, operator must stand in a position that will prevent him from being struck by crank if engine rotation is reversed. Do not spin crank.

DURING OPERATION

When running machine down a ramp; gravity may cause the crawler to coast on the side on which the clutch is being slipped. The engine acts as a brake on opposite crawler thereby reversing normal effect of steering. Move control lever further forward, as brake is applied and stop the coasting. Attach a snubbing line to rear of screed frame to prevent the machine from "getting away".

If dry planks are not available when unloading machine from flat car, and ties are used as a ramp, be sure to use dry ties, as creosoted ties are slippery and dangerous.

If only creosoted ties are available, use sand on them to prevent slipping. Block the car so it cannot move either way as the machine is being run off. Set car brakes to insure safety.

AFTER OPERATION

During maintenance when checking screed plates with screed unit raised, block screed to prevent accidental lowering.

When hand cranking for timing or adjustment purposes, disconnect the distributor coil cable from coil to prevent accidental starting of engine.

During maintenance of screed unit, watch the spring connecting two eccentric shafts as it might still be under tension and might spring out as shaft is removed.

When compressing drive spring for replacement be sure jaws of the vise are square, as the spring, when fully compressed, develops approximately 600 lbs or 270 kilograms pressure, and might cause damage if it slips from vise. Do not clip binding until spring, sheave, and hub are in place.

Stop the engine when greasing, oiling, or making any adjustment.

WARNING

Dry cleaning solvent, PD-680, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100 °F - 138 °F.

TECHNICAL MANUAL
No. 5-3895-275-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. 27 December 1974

DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL

PAVING MACHINE, BITUMINOUS MATERIAL:

GASOLINE ENGINE DRIVEN;

CRAWLER MOUNTED; 8-TO-10 FEET WIDE

(BARBER-GREENE MODEL SA-35)

FSN 3895-057-8715

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*This manual, together with TM 5-3895-275-12, 31 December 1974, supersedes TM 5-3895-275-15, 29 February 1968, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains instructions for the use of direct and general support maintenance personnel maintaining the Barber-Greene Model SA-35 paving machine as allocated by the maintenance allocation chart contained in TM 5-3895-275-12. It provides information on the maintenance of the equipment which is beyond the scope of the tools, equipment, personnel, or supplies normally available to operational and organizational maintenance.

1-2. Forms and Records

Maintenance forms and records that you are required to use are explained in TM 38-750.

1-3. Reporting of Errors

You can improve this manual by calling attention to errors and by recommending improvements, using DA Form 2028 (Recommended Changes to Publications) or by a letter, and mail direct to Commanding General, Tank Automotive Command, ATTN: AMSTA-MPA, Warren, Michigan 48090. A reply will be furnished directly to you.

1-4. Equipment Serviceability Criteria (ESC)

This equipment is not covered by an ESC.

1-5. Destruction of Army Material to Prevent Enemy Use

Refer to TM 750-244-3 for procedures for destruction of equipment to prevent enemy use.

1-6. Administrative Storage

Refer to TM 740-90-1 for information concerning administrative storage.

Section II. DESCRIPTION AND DATA

1-7. Description

The paving machine (figs. 1-1 and 1-2) is a crawler-mounted paving machine, powered by a six cylinder, overhead valve, liquid-cooled gasoline engine. The paving machine laying width can be increased from 8- to 12-feet, by adding cutoff shoes and extensions. The maintenance paragraphs of this manual contain detailed descriptions of its components.

1-8. Tabulated Data

a. Torque Data (Engine).

Cylinder head bolts	92—100 ft-lb (foot pounds)
Connecting rod nuts	56—58 ft-lb
Main bearing screws	107—112 ft-lb
Flywheel screw	67—69 ft-lb

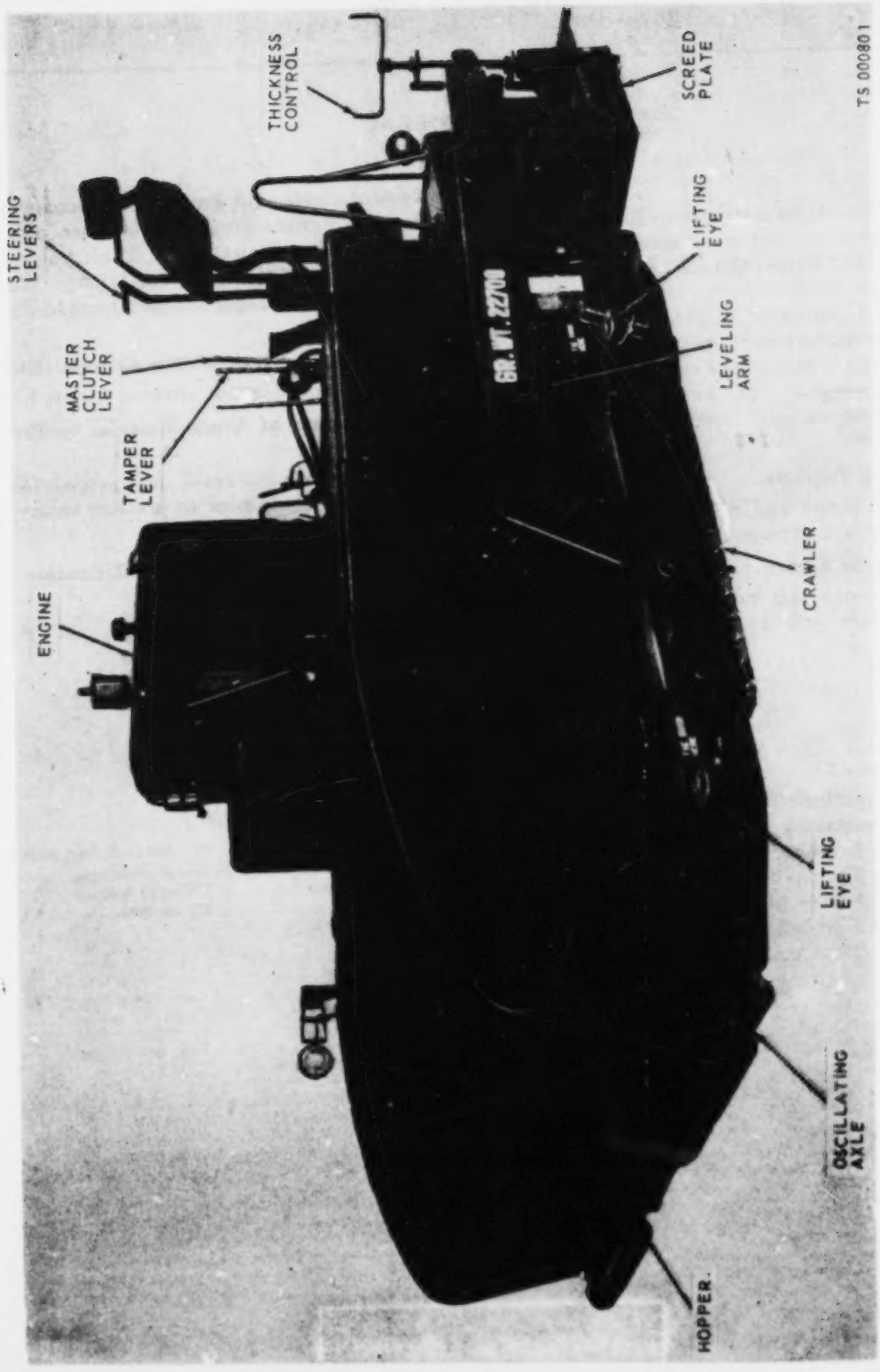


Figure 1-1. Paving machine, left-front, three-quarter view.

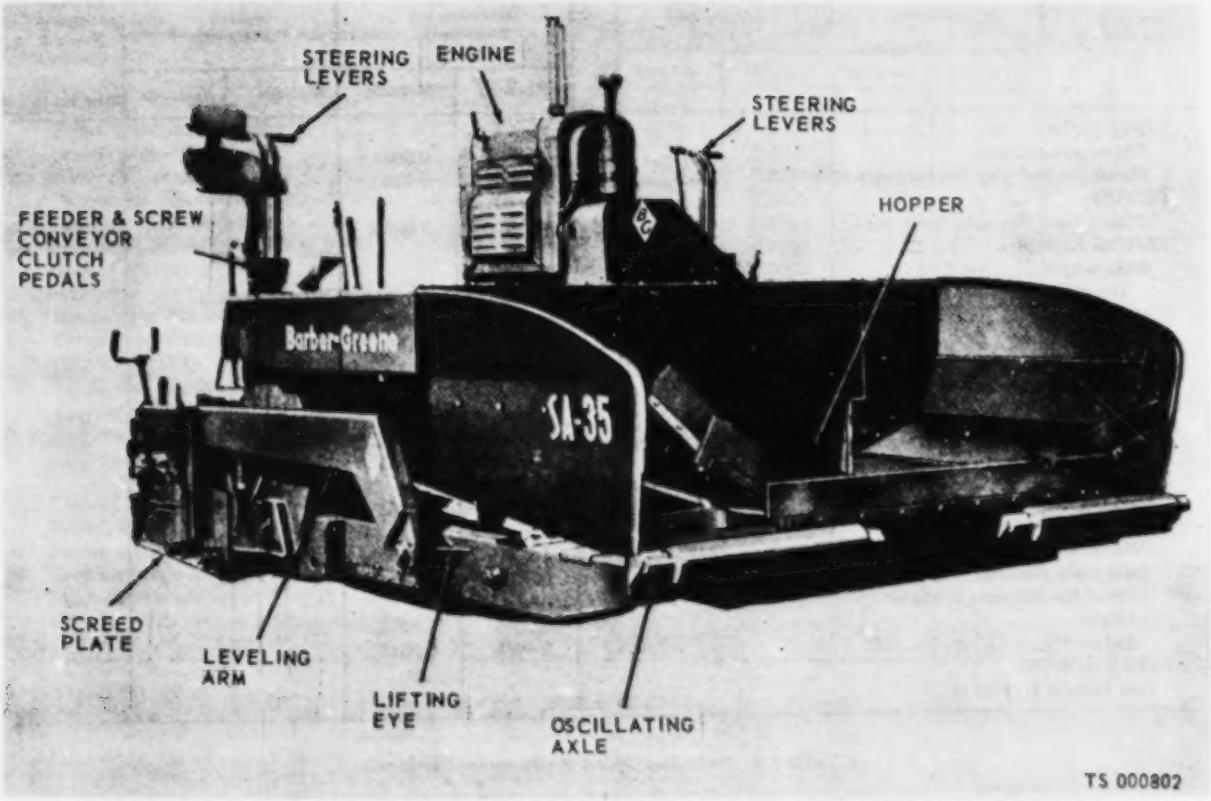


Figure 1-2. Paving machine, right front, three-quarter view.

b. Repair and Replacement Standards. Tables 1-1 and 1-2 list the manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearance.

Table 1-1. Engine Repair and Replacement Standards

Component	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Minimum	Maximum	Minimum	Maximum	
CAMSHAFT					
End clearance	0.0015	0.003			
CONNECTING ROD					
Center to center distance	6.969	6.964			
Piston pin bearing should be machined to ID of	0.9901	0.9904			
CRANKSHAFT	2.623	2.624			
Main journal diameter	2.623	2.624			
Main bearing clearance			0.0024	0.0044	
End clearance			0.003	0.007	
Connecting rod journal diameter	2.2475	2.2485			
FLYWHEEL AND HOUSING					
Pilot bearing run-out		0.005			
Face run-out on wheel		0.008			
Housing bore run-out		0.010			
Housing face run-out		0.006			
GOVERNOR					
Backlash between drive gear and camshaft gear			0.002	0.003	

Table 1-1. Engine Repair and Replacement Standards—Continued

Component	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Minimum	Maximum	Minimum	Maximum	
PISTON PIN					
Piston pin diameter	0.9899	0.9901			
Piston pin end play between retainers	0.003	0.036			
PISTON					
Piston land clearance with bore	0.023	0.0285			
PISTON RINGS					
Ring width:					
Top ring	0.0930	0.0940			
2nd ring	0.0930	0.940			
3rd & 4th ring	0.1545	0.1555			
Ring gap	0.010	0.020			0.045
Ring groove clearance:					
Top ring	0.002	0.004			0.006
2nd ring	0.0015	0.0035			0.006
3rd & 4th ring	0.005	0.0035			0.006
ROCKER ARMS					
Running clearance on rocker shaft	0.0015	0.0035			
VALVE AND VALVE SEAT					
Valve head diameter	1.5000	1.500			
Valve stem diameter	0.3405	0.3415			
Valve stem clearance in guide:					
Intake	0.0015	0.0035			
Exhaust	0.0025	0.0045			
VALVE SPRING					
Free Length 2-15/32 in.					

Table 1-2. Paver Repair and Replacement Standards

Component points of measurements	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Minimum	Maximum	Minimum	Maximum	
THICKNESS CONTROL					
Control screw-thread wear	1.4900	1.5000			0.0625
COMBUSTION CHAMBER					
Pin-outside dia.	0.4980	0.5000			0.03125
SCREW FEEDERS					
Sprocket (13T)-Wear on leading edge of tooth					0.03125
Bronze washer-thick	0.1872	0.1875			0.09375
Shaft-outside dia.	1.6795	1.6875			0.0625
Shaft-outside dia.	1.9930	2.0000			0.0625
Paddles-thickness		0.3750			0.2500
Paddle ext.-thickness		0.3750			0.2500
Bushing-inside dia	2.0156	2.0226			2.0530
Seal-inside dia.	2.0150	2.0300			2.0600
Sprocket- (11T)-Wear on leading edge of tooth					0.03125
Collar-thick.		0.7500			0.03125
Felt washer-inside dia. bushing		2.0000			0.03125
Screw conveyors-thick		0.3750			0.2500
FEEDING SHAFTS					
Sprocket (11T)-Wear on leading edge of tooth					0.03125
Sprocket (23T)-Wear on leading edge of tooth					0.03125
Shaft-Outside Dia.		2.4375			0.0625
Bearing bracket-Inside dia.	2.4390	2.4430			2.490
Sprocket (8T)-Wear on leading edge of tooth					0.0625
Roller-Flange thick		0.3125			0.0625
FEEDER DISCHARGE					
Skirt plate-thick		0.2500			0.09375
Rubber-thickness		0.3125			0.1875
Feeder flight-thickness		0.8750			0.3750

Table 1-2. Paver Repair and Replacement Standards—Continued.

Component points of measurements	Manufacturer's Dimensions Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Minimum	Maximum	Minimum	Maximum	
SCREED					
Screed plate-rear bar-thick		0.8750			0.2500
Cut-off plate-thickness		0.2500			0.1875
Blade Ext.-thickness		0.3750			0.1875
Pin-outside dia.		0.8750			0.0625
Deflector blade-thickness		0.3750			0.1250
End plate-thickness		0.3750			0.2500
Rubber flashing-width		8.0000			0.5000
TAMPERS					
Tamper bar ext.-bottom edge thickness		0.3125			0.2500
Tamper bars-bottom edge thickness		0.3125			0.2500
TAMPER DRIVE					
Spring-free length		5.4375			5.3125
Bushing-inside dia.	1.6890	1.6900			1.7100
Shaft-outside dia.	1.6760	1.6780			1.6900
Collar-inside dia.	1.4395	1.4425			1.4720
TRACTION DRIVE					
Crawler link-wear on pin hole					0.046875
Spring-free length		8.5000			8.2500
Spring guide-wear on pivot hole					0.5000
Bushing-inside dia.	1.6985	1.7005			1.7150
Shaft-outside dia.		2.1875			0.0625
Sprocket (9T)-wear on leading edge of tooth					0.03125

CHAPTER 2

DIRECT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

2-1. Special Tools and Equipment

No special tools or equipment are required by direct and general support maintenance personnel for performing maintenance on the paving machine.

2-2. Direct and General Support Maintenance Repair Parts

Direct and general support maintenance repair parts are listed and illustrated in TM 5-3895-275-34P.

2-3. Specially Designed Tools and Equipment

No specially designed tools and equipment are required for maintenance of the paving machine.

Section II. TROUBLESHOOTING

2-4. General

a. This section contains troubleshooting procedures for locating and correcting most of the operating troubles which may develop in the paver and its components. Each malfunction for an individual component, unit, or system is followed by a list of tests of inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

2-5. Troubleshooting Table

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 2-1. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. ENGINE MISFIRES ON ONE OR MORE CYLINDERS
Test engine for low compression.
Perform engine compression test.
(1) Start the engine and allow it to idle until it reaches normal operating temperature.
(2) Turn the ignition switch off and leave it in OFF position.
(3) Remove the spark plugs.
(4) Install a compression gage tightly in number one spark plug hole.
(5) Crank the engine with the starter to allow several revolutions. Note the reading on the gage. Record the reading.
(6) Repeat the test on each of the remaining cylinders. Compression readings for the cylinders should not vary more than 10 pounds.
(7) Retest low-reading cylinders using the oil test as follows:
(a) Add oil through the spark plug hole in an amount sufficient to seal the piston rings.
(b) Crank the engine over five or six times to allow the oil to work down around the rings and take another compression reading.
(c) An increase in compression indicates defective or worn piston or piston rings.
(d) No increase in compression indicates defective valves.
(e) Two adjacent low reading cylinders may indicate a defective cylinder head gasket.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. ENGINE KNOCKS
Step 1. Inspect for loose connecting rod bearings.
Replace bearings (para 3-3).
Step 2. Check for loose main bearings (heavy knock-low oil pressure).
Replace main bearings (para 3-7).
3. MASTER CLUTCH SLIPS
Inspect clutch driving discs.
Replace clutch driving discs (para 3-10).
4. ENGINE OVERHEATS
Inspect radiator for leaks.
Repair radiator (para 3-17).
5. IMPROPER SHIFTING OF TRANSMISSION
Inspect transmission shift forks.
Replace transmission shift forks (para 3-22).
6. ALTERNATOR DOES NOT GENERATE CURRENT
Step 1. Check for shorted rotor or stator.
Replace or repair (para 3 13).
Step 2. Inspect for dirty slip rings.
Clean slip rings (para 3-13).
7. PAVER STEERS ERRATIC
Step 1. Check for dirty or worn steering clutch disc.
Clean or replace clutch disc (para 3-25).
Step 2. Check for dirty or worn steering brake disc.
Clean or replace brake disc (para 3-26).
Step 3. Check for steering clutches and brakes not adjusted properly.
Adjust clutch and brakes (refer to TM 5-3895-275-12, para 4-78).
8. HYDRAULIC RAMS WILL NOT RAISE SCREED UNIT
Step 1. Inspect for defective hydraulic pump.
Replace pump (para 3-31).
Step 2. Inspect for defective control valve.
Replace control valve (para 3-32).
Step 3. Check for defective hydraulic rams.
Replace hydraulic rams (para 3-33).
9. TAMPERS NOT OPERATING PROPERLY
Check for broken connecting spring between eccentric shafts.
Replace spring (para 3-53).

Section III. GENERAL MAINTENANCE

2-6. General

This section contains general maintenance information that would otherwise have to be repeated throughout this manual.

2-7. Maintenance Requirements

a. Hardware and Threaded Parts. Inspect hardware for damaged threads, rounded corners, and damaged slots. Threaded holes and parts should accept their mating parts without requiring excessive torque. Threads may be chased with a tap or die. Replace any threaded parts which cannot be repaired.

b. Gaskets. Replace all gaskets which are disturbed during repair operation or which show evidence of leakage. When installing gaskets, insure all gasket surfaces are clean and free from nicks and burs. Use grease or gasket cement to retain gasket in position during assembly procedures.

c. Oil Seals. Thoroughly lubricate the sealing lip of spring loaded seals with grease when installing. Apply non-hardening sealer to the outer circumference of encased seals or to the mating bores to prevent possible leakage. Immerse preformed packings in the liquid or lubricant with which they will be in contact.

d. Ball and Roller Bearings. After removing anti-friction bearings, cover them immediately to keep out dirt and abrasives. Flush thoroughly with solvent, tap them against a wooden block to remove packed lubricant and dry thoroughly. Coat cleaned bearings with oil and wrap in clean paper. Replace any bearings that are scored, pitted, discolored from overheating, or otherwise

damaged. When installing bearings against shoulders, be sure the chamfered side faces the shoulder. Lubricate the bearing and its mating surface when pressing a bearing into place. Press bearings only on the race adjacent to the mating part. Use drivers which contact as much of the race as possible.

e. Repair of Damaged Machined and Polished Surfaces. Remove rough spots, scores, burs, gouges, and other surface damage from machined and polished surfaces. Use a suitable honing stone, crocus or emery cloth, file, or any other method that will permit the part to function efficiently. The finish of the part must approximate that of the original finish. Do not alter critical dimensions beyond acceptable limits. Build up shafts, rods, and other worn parts by metalizing, chrome plating, or welding. Grind built up parts to original size.

f. Welding Repair. Welding must be performed by a qualified welder. Welds must complete fusion and penetration and comply with governing specifications. Inspect welds using a radiographic or magnetic particle process. Grind all new welds flat and smooth whenever possible.

g. Cleaning. Clean all parts with cleaning solvent (Spec. PD-680) and dry thoroughly, unless otherwise specified in the contents of this manual. Parts cleaned with steam must be protected with an even coating of 0E10 oil applied immediately after drying with filtered compressed air. Never dry bearings with compressed air.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

2-8. General

This section contains instructions for removal and installation of major components of the paving machine to facilitate repair and overhaul procedures. Removal of assemblies and repair instructions are covered in subsequent sections of the manual.

2-9. Engine and Clutch Assembly (Fig. 2-1)

NOTE

Engine assembly and clutch assembly can be removed individually. To remove engine follow paragraphs (1) through (14) and to remove clutch follow paragraphs (16) and (17).

a. Removal.

(1) Drain lubricating oil from oil pan.

(2) Remove muffler and exhaust pipe.

(3) Remove engine hood and side doors.

(4) Tag and disconnect all electrical leads to starting motor and instrument panel.

(5) Disconnect clutch and throttle linkage.

(6) Disconnect choke control.

(7) Drain coolant from radiator and cylinder block.

(8) Remove radiator and fan guard.

(9) Remove priming system.

(10) Remove screw (1, fig. 2-1) and lockwasher (2) from radiator drain bracket (3).

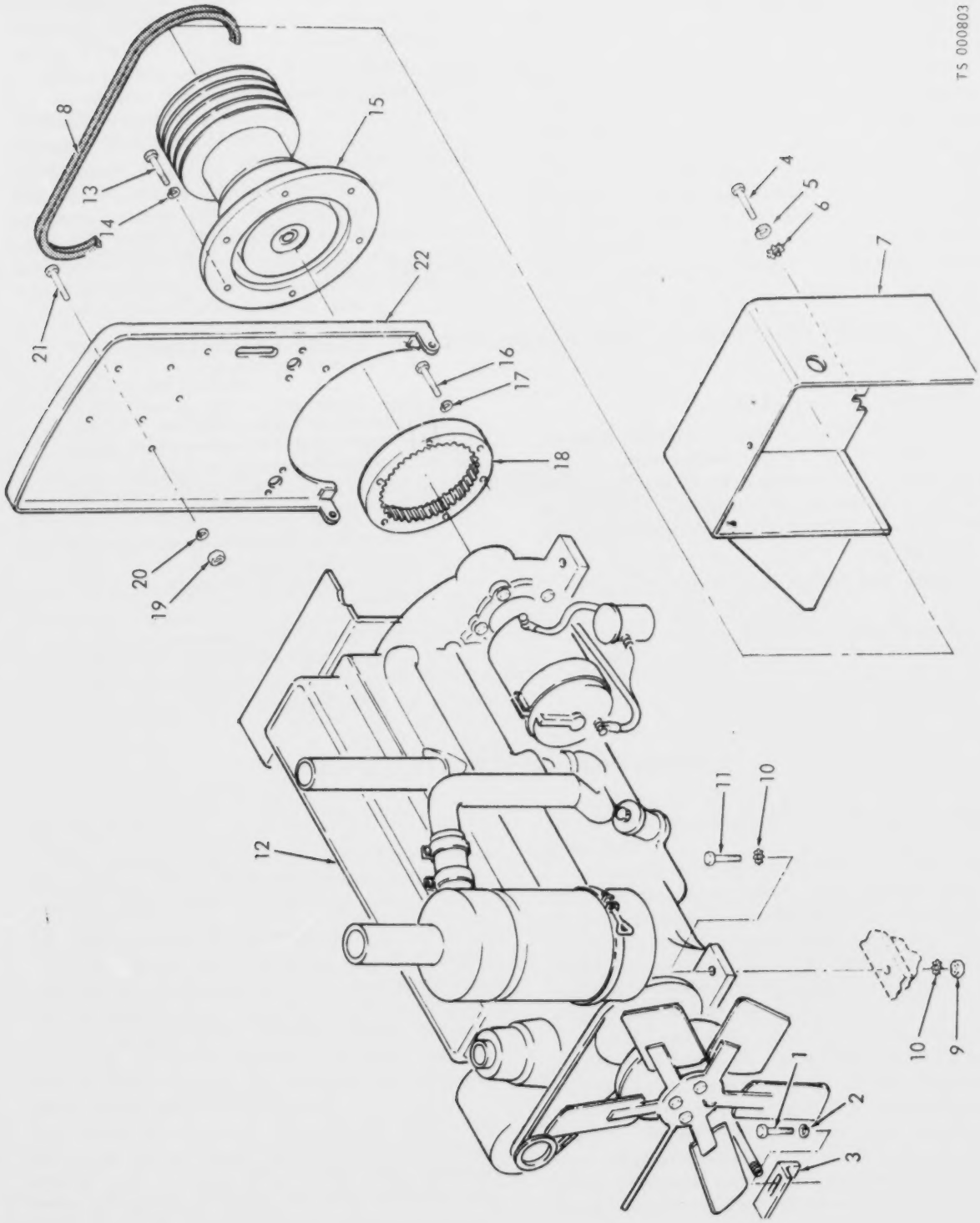


Figure 2-1. Engine assembly.

KEY for figure 2-1.

1. Screw
2. Lockwasher
3. Bracket
4. Screw
5. Lockwasher
6. Flatwasher
7. Belt guard
8. Transmission drive belts
9. Nut
10. Lockwasher
11. Screw
12. Engine
13. Screw
14. Lockwasher
15. Clutch assembly
16. Screw
17. Lockwasher
18. Clutch driven gear
19. Nut
20. Lockwasher
21. Bolt
22. Engine rear panel

(11) Remove screws (4), lockwashers (5), flatwashers (6), and remove transmission drive belt guard (7).

(12) Loosen engine mounting screws and slide engine toward transmission to provide slack in transmission drive belts (8). Remove transmission drive belts.

(13) Use a hoist with sufficient capacity to remove engine. Place a slight tension on the cable.

(14) Remove nuts (9), lockwashers (10) and screws (11), and remove engine (12).

(15) Remove screws (13) and lockwashers (14), and remove clutch assembly (15).

(16) Remove screws (16), lockwashers (17), and clutch driven gear (18).

(17) Remove nuts (19), lockwashers (20) and bolts (21) and remove engine rear panel (22).

b. Installation.

(1) Position engine rear panel (22) on engine and secure with bolts (21), lockwashers (20), and nuts (19).

(2) Position clutch driven gear (18) on flywheel and secure with lockwashers (17) and screws (16).

(3) Position clutch assembly (15) on engine and secure with lockwashers (14) and screws (13).

(4) Use a hoist with sufficient capacity and position engine (12) on the paving machine. Secure engine with screws (11), lockwashers (10), and nuts (9). Do not tighten engine mounting screws.

(5) Install transmission drive belts (8). Slide engine toward hydraulic tank until proper belt tension is achieved. Tighten engine mounting screws.

(6) Install transmission drive belt guard (7) and secure with flatwashers (6), lockwashers (5), and screws (4).

(7) Install screw (1), and lockwasher (2) in radiator drain bracket (3).

(8) Install priming system.

(9) Install radiator and fan guard.

(10) Connect choke control.

(11) Connect clutch and throttle linkage.

(12) Connect all electrical leads.

(13) Install exhaust pipe.

(14) Install engine hood and side doors.

(15) Install engine muffler.

(16) Refer to current lubrication order and service the engine.

(17) Add coolant to the radiator.

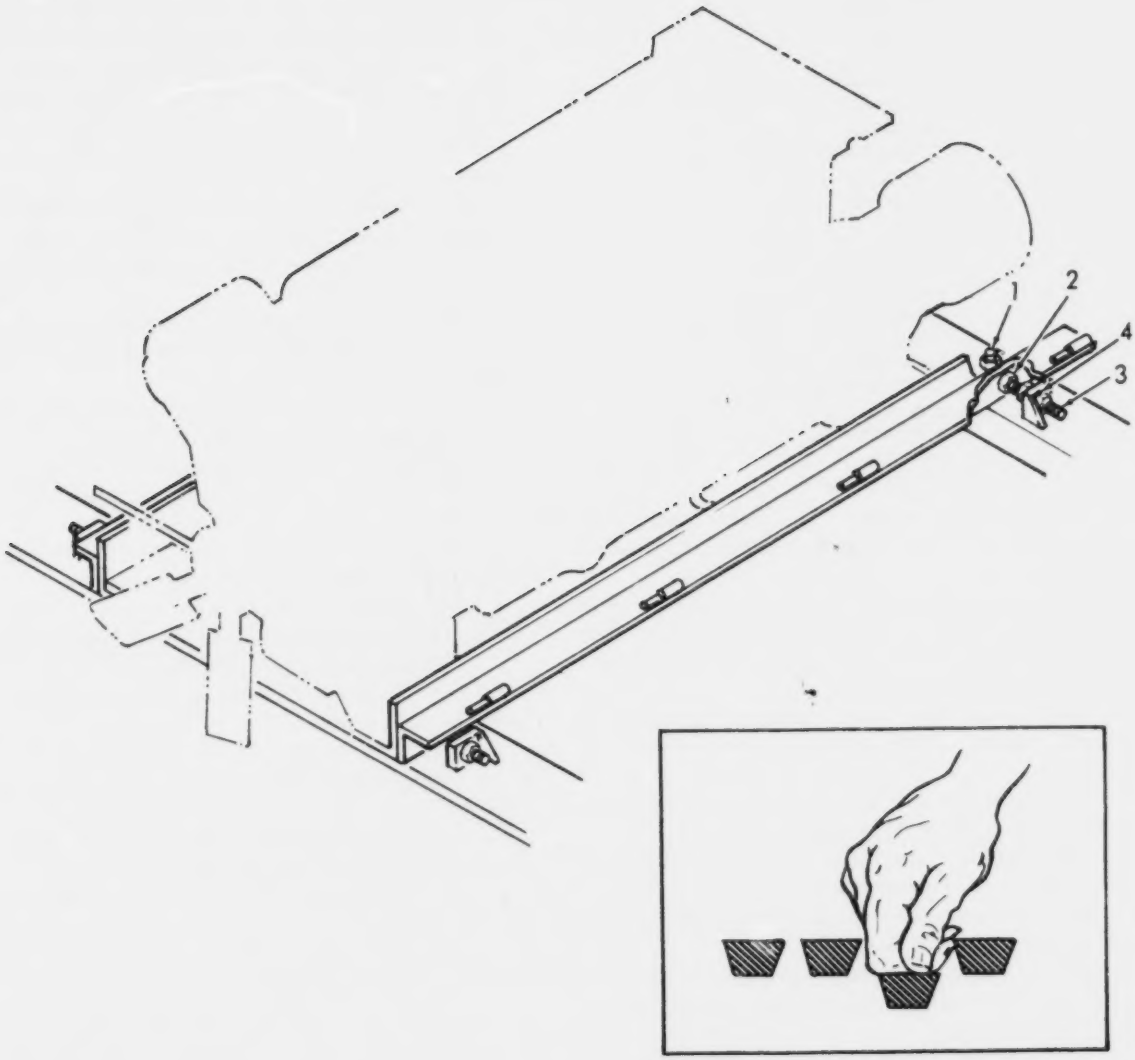
c. Transmission Drive Belts Adjustment (Fig. 2-2).

(1) Loosen engine support frame bolts (1). Loosen lock nuts (2) on take-up rods (3).

(2) Tighten nuts (4) until correct belt tension is obtained.

NOTE

A simple test which can be made to check V-belt drive tension is illustrated in figure 2-2. Press down firmly on each individual belt. When the top can be depressed so that it is in line with the bottom of the other belts on the drive, the correct amount of tension has been applied. Each belt should be given this test individually.



1. Bolt
2. Nut
3. Take-up rod
4. Nut

Figure 2-2. Transmission drive belts, adjustment.

(3) Tighten locknuts (2) and frame support bolts (1).

2-10. Transmissions, Main and Secondary (Fig. 2-3)

a. General. Both the main and secondary transmissions may be removed as a unit or together.

b. Removal.

(1) Remove deck plates over transmissions and guard at drive end to provide access to transmissions and drive.

(2) Loosen engine support frame bolts and slide engine toward transmissions to provide slack in transmission drive belts. Remove transmission drive belts.

(3) Loosen hydraulic pump mounting screws and hydraulic pump drive belt adjusting screws. Remove hydraulic pump drive belt.

(4) Remove main transmission shift lever control and disconnect Forward-Reverse control at transmission. Disconnect secondary transmission shift control at transmission.

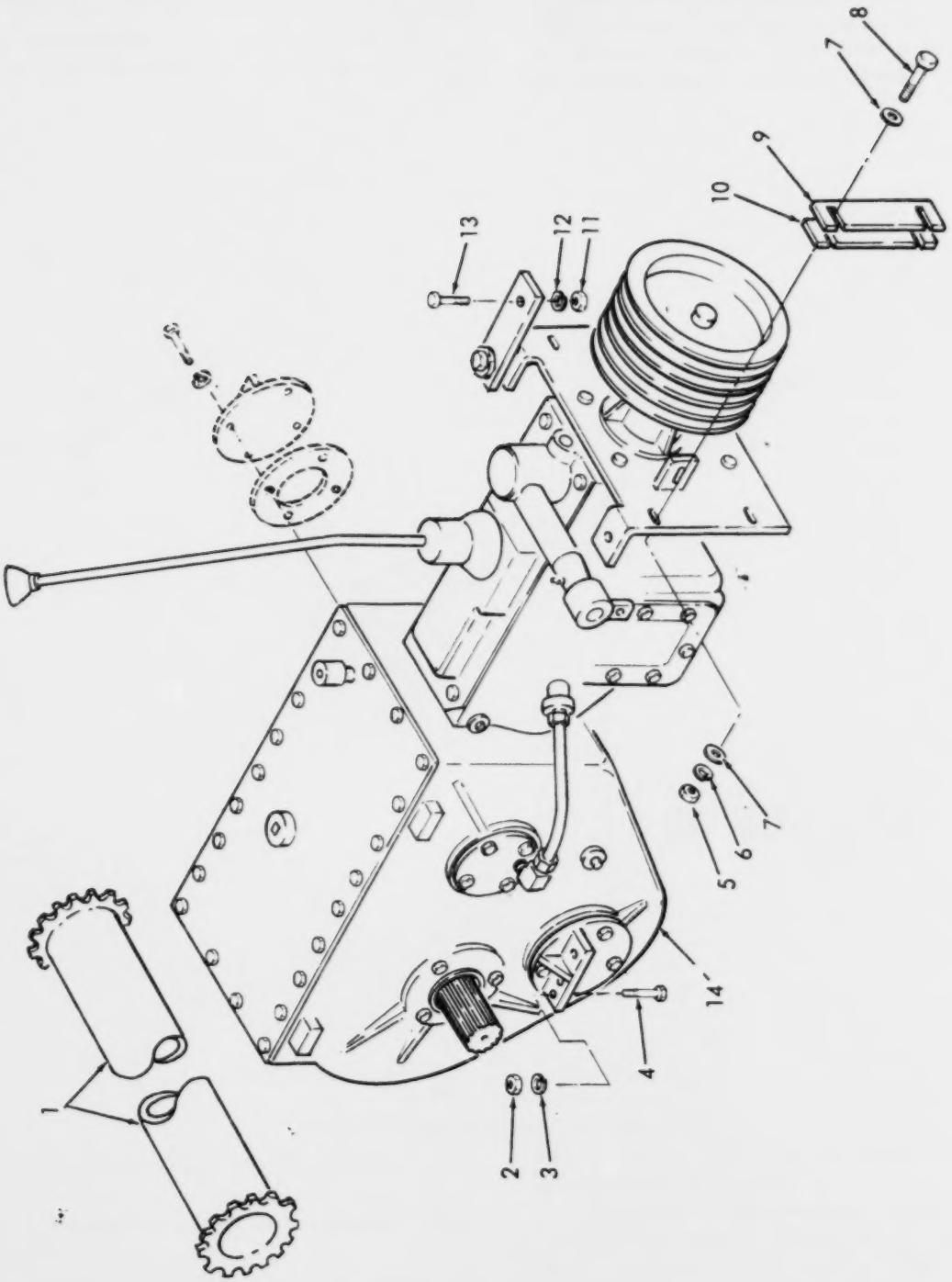
(5) Disconnect chain couplings (1) on output shaft on both sides of secondary transmission.

(6) Use a hoist with sufficient capacity to remove transmissions. Place a slight tension on the cables.

(7) Remove nuts (2), lockwashers (3), and screws (4).

(8) Remove nuts (5), lockwashers (6), flatwashers (7), and bolts (8). Remove shims (9) and (10).

(9) Remove nuts (11), lockwashers (12), bolts (13) and remove the transmissions (14) as a unit.



TS 000805

KEY for figure 2-3.

1. Chain
2. Nut
3. Lockwasher
4. Screws
5. Nuts
6. Lockwashers
7. Flatwasher
8. Bolt
9. Shim
10. Shim
11. Nut
12. Lockwasher
13. Bolt
14. Transmission

c. Installation.

(1) Use a hoist with sufficient capacity and position transmissions (14), on the paving machine. Install shims (10) and (9). Secure the transmission with bolts (13), lockwashers (12), nuts (11), bolts (8), flatwashers (7), lockwashers (6), and nuts (5).

(2) Install screws (4), lockwashers (3), and nuts (2).

(3) Install chain couplings (1) on output shaft on both sides of secondary transmission.

(4) Install main transmission shift lever control and forward-reverse control at transmission. Connect secondary transmission shift control at transmission.

(5) Install hydraulic pump drive belt. Adjust drive belt by turning adjusting screw clockwise or counterclockwise. Tighten hydraulic pump mounting screws.

(6) Install transmission drive belts. Refer to paragraph 2-8 and adjust transmission drive belts.

(7) Install deck plates over transmission and guard at drive end.

CHAPTER 3

REPAIR OF PAVING MACHINE

Section I. ENGINE ASSEMBLY

3-1. General

This section contains direct and general support maintenance procedures for the engine assembly and components.

3-2. Cylinder Head

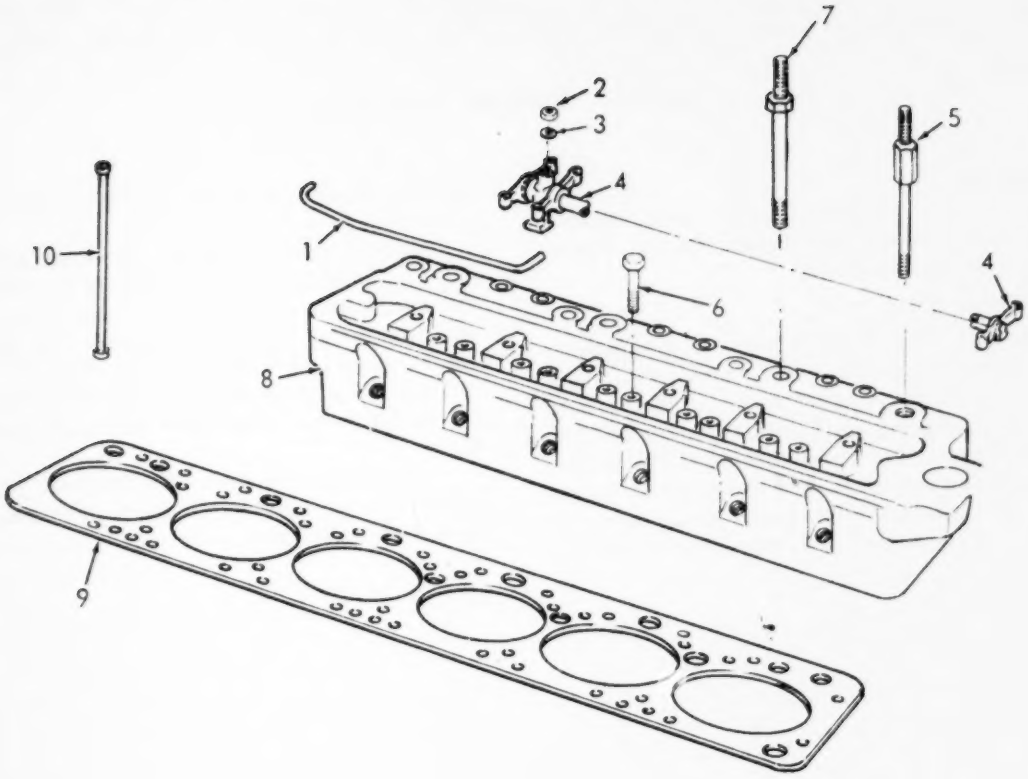
a. General. The cylinder head is a one-piece casting with the intake valve seats part of the casting. The exhaust valve seats are inserts and the valve guides are of the removable type. The intake valves control the admission of the air-fuel mixture to the cylinders, and the exhaust valves control the expulsion of exhaust gases from the cylinders. The rocker arm assembly, which is mounted on the top of the cylinder head, actuates the valves.

b. Rocker Arm Assembly Removal (Fig. 3-1).

(1) Refer to TM 5-3895-275-12 for removal of the intake and exhaust manifolds, water pump and fan, valve cover, thermostat and housing, spark plugs and wires, and air cleaner.

(2) Remove oil line (1), nut (2), and washer (3), and remove rocker arm and shaft assembly (4).

(3) Remove screws (5), screws (6), and screws (7) and remove cylinder head assembly (8), gasket (9), and push rods (10).



1. Oil line
2. Nut
3. Washer
4. Rocker arm and shaft assembly
5. Screw
6. Screw
7. Screw
8. Cylinder head assembly
9. Gasket
10. Push rod

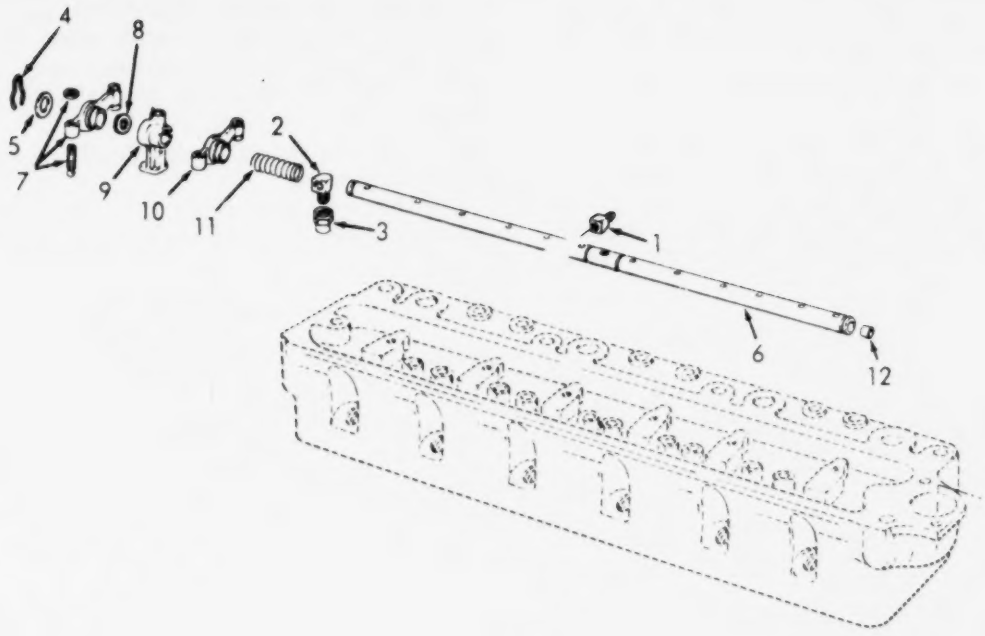
Figure 3-1. Cylinder head assembly and rocker arm and shaft assembly.

c. Disassembly of Rocker Arm and Shaft Assembly.

(1) Remove adapter (1, fig. 3-2), elbow (2), and spacer (3).

(2) Remove clip (4) and washers (5) from each end of the rocker arm shaft (6).

(3) Remove rocker arm (7), washer (8), rocker arm shaft supports (9), rocker arm (10), spring (11), and plug (12) from the rocker arm shaft.



TS 000807

1. Adapter
2. Elbow
3. Spacer
4. Clip
5. Washer
6. Rocker arm shaft
7. Rocker arm
8. Washer
9. Rocker arm shaft supports
10. Rocker arm
11. Spring
12. Plug

Figure 3-2. Rocker arm assembly, disassembly.

d. Cleaning, Inspection, and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Clean all lubrication passages with compressed air.

(3) Inspect the rocker arms for cracks or breaks. Replace defective rocker arms.

(4) Inspect the rocker arm shaft for wear, scoring, and ridges from the action of rocker arms on the shaft. Replace a defective rocker arm shaft.

(5) Inspect the springs and rocker arm shaft supports for cracks, breaks, and other damage. Replace defective parts.

NOTE

Recent production engines of the Model 190 series are built with rocker arms incorporating oil holes offset 30° from the former vertical position. No change was made in the rocker arm shaft. Replacement rocker arms will change to the latest type and attention is called to the fact that although the two rocker arm types can be interchanged in complete sets on any engine, the old and the new types should never be mixed together and used on the same engine. Attempts to use both types of rockers on the same engine will seriously disturb the lubrication. In addition, the older type rocker was lubricated through a pressure line fitting with a relief hole. If a changeover to a set of new rocker arms is made, the relieved fitting should be replaced with a standard undrilled fitting. Identification of the two rocker arm designs is readily made by the straight-through drilling of the oil passage through the bushing in the earlier rocker. If no bushing is in the rocker arm, it will be possible to make identification by inspecting for the short radial groove extending from top oil hole around the inner bore for 45° in the new rocker arms.

e. Reassembly.

(1) Install two clips (4, fig. 3-2) on the center of the rocker arm shaft (6).

(2) Install the adapter (1) and the two plugs

(12) in the rocker arm shaft. Install the spacer (3) and elbow (2) in the cylinder head oil screw.

(3) Install springs (11), rocker arms (10), rocker arm shaft support (9), washers (8), rocker arms (7), washers (5) in their respective order on the rocker arm shaft (6).

(4) Install clip (4), on each end of the rocker arm shaft

f. Disassembly of the Cylinder Head (fig. 3-3).

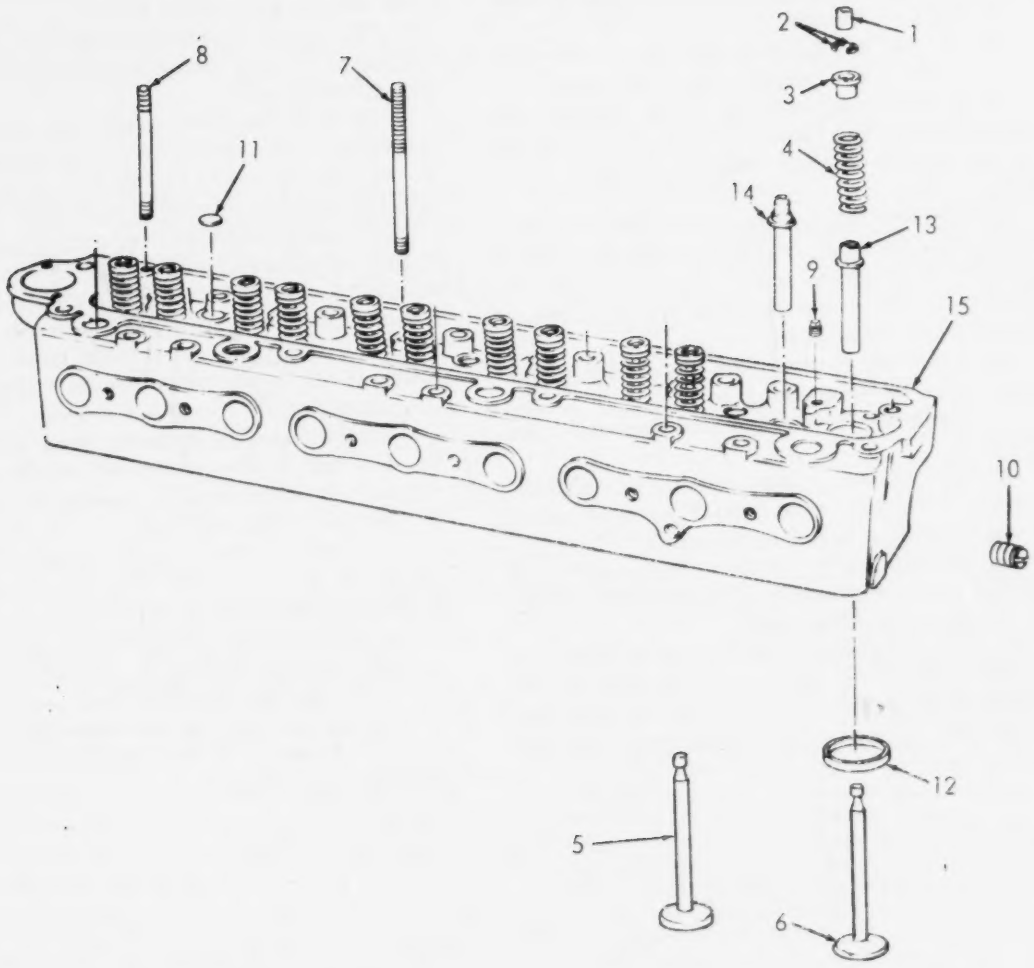
(1) Remove valve stem caps (1) from the intake and exhaust valves.

(2) Compress the valve spring (4) with a valve spring compressor and remove the valve spring retainer locks (2) from the stem of all exhaust and intake valves.

(3) Release the valve spring compressor and remove the valve spring retainers (3) and valve springs (4). Remove the exhaust valves (5) and intake valves (6) from the cylinder head. Store valves in order of removal for reinstallation in the cylinder head.

(4) Remove rocker arm studs (7) and (8) from the cylinder head.

(5) Remove pipe plugs (9) and (10) and expansion plugs (11) from the cylinder head (15).



TS 000808

1. Valve stem cap
2. Valve spring retainer locks
3. Valve spring retainer
4. Valve spring
5. Exhaust valves
6. Intake valves
7. Stud, rocker arm
8. Stud, rocker arm
9. Pipe plug
10. Pipe plug
11. Expansion plug
12. Exhaust valve insert
13. Intake valve guide
14. Exhaust valve guide
15. Cylinder head

Figure 3-3. Cylinder head, disassembly.

(6) Use a valve insert puller and remove the exhaust valve inserts (12) from the cylinder head (15).

(7) Use a suitable puller and remove the valve guides (13) and (14) from the cylinder head (15).

g. Cleaning, Inspection, and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Remove all carbon from the cylinder head and the top of the pistons and cylinder block with a wire brush or scraper.

(3) Inspect the cylinder head for cracks and warpage. Replace a defective cylinder head.

(4) Inspect the exhaust valve inserts for cracks, pitting, and breaks. Grind slightly worn or pitted inserts. Replace defective exhaust valve inserts.

(5) Inspect the intake valve seats in the cylinder head for wear, cracks, and pitting. Grind slightly worn or pitted intake valve seats. If the intake valve seats are damaged beyond repair, replace the cylinder head.

(6) Ream the carbon from the valve guides with a valve guide cleaning tool.

(7) Clean the carbon and lead deposits from the valves.

(8) Inspect the valves for cracks, pitting, warpage, or burned faces. Reface worn or pitted valves. Replace a defective valve.

(9) Inspect valve guides for cracks and excessive wear. Replace a defective valve guide.

h. Reassembly (Fig. 3-3).

(1) Press the new or serviceable valve guides (14) and (13) to the same depth location of the removed valve guides. Valve guides are machined to provide proper stem clearance without reaming.

(2) Position an exhaust valve insert (12) in the remachined counterbore and press or drive it into position.

(3) Peen the metal from the cylinder head over the exhaust valve insert.

(4) Install expansion plugs (11), pipe plugs (10), and (9), and rocker arm studs (8) and (7) in the cylinder head.

(5) Coat the valve stems with engine oil and insert the intake valves (6) and exhaust valves (5) in the cylinder head. Install the valve spring (4) and valve spring retainer (3) one each valve stem.

(6) Compress the valve spring with a valve spring compressor and install the valve spring retainer locks (2) in the slot in the valve stem. Release the valve spring compressor.

(7) Install the valve stem caps (1) on the stems of all intake and exhaust valves.

i. Installation.

(1) Position the cylinder head assembly (8, fig. 3-1) and a new gasket (9) on the crankcase and secure with screws (7), screws (6), and screws (5). Install push rods (10).

(2) Tighten the cylinder head screws to a torque of 92-100 ft-lbs. The screws should be progressively tightened; working from the center of the cylinder head toward each end (fig. 3-4).

(3) Install rocker arm and shaft assembly (4, fig. 3-1), on the cylinder head assembly and secure with washers (3) and nuts (2). Install oil line (1). Refer to TM 5-3895-275-12 for valve clearance adjustment.

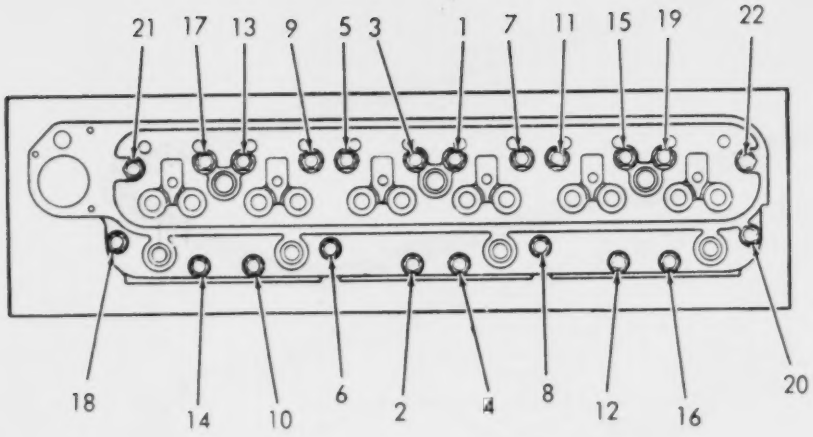


Figure 3-4. Cylinder head tightening sequence.

NOTE

On new engines or whenever new cylinder head gaskets have been installed, the valve rocker arm and shaft assembly must be removed, the cylinder head bolts retorqued and the valve lash adjusted after the first 50-to 100-hours of operation.

(4) Refer to TM 5-3895-275-12 and install the intake and exhaust manifolds, water pump and fan, valve cover, thermostat and housing, spark plugs, wires, and air cleaner.

3-3. Pistons and Connecting Rods

a. General. The aluminum-alloy pistons each have 2 compression rings and 2 oil rings. The 2 oil rings fit in the lower grooves of the pistons. The connecting rods are alloy steel with precision-type insert bearings for the crankshaft and sleeve-type bearings for the floating piston pins. The pistons and walls of the cylinder sleeves are lubricated by connecting rod throwoff.

b. Piston and Connecting Rod Removal (*Fig. 3-5*).

(1) Refer to paragraph 3-2 and remove the cylinder head.

(2) Drain engine lubricating oil from the oil pan.

(3) Remove nuts (1), lockwashers (2), bolts (3), lockwashers (4), and remove oil pan (5), and gasket (6).

NOTE

Many of the oil pans used on engines in this series are held at the rear flange by two long, special bolts extending downward through the flywheel housing. This is necessary in order to provide adequate gasket pressure in this area and at the same time avoid placing the oil pan bolts in an inaccessible position. These long capscrews must be removed before withdrawing the oil pan.

On reinstalling these capscrews it will be found that the heads do not seat on the flywheel housing. This is done to insure full pressure at the pan gasket. Attempting to seat the heads against the flywheel housing will strip the threads at the oil pan to rear oil seal joint.

CAUTION

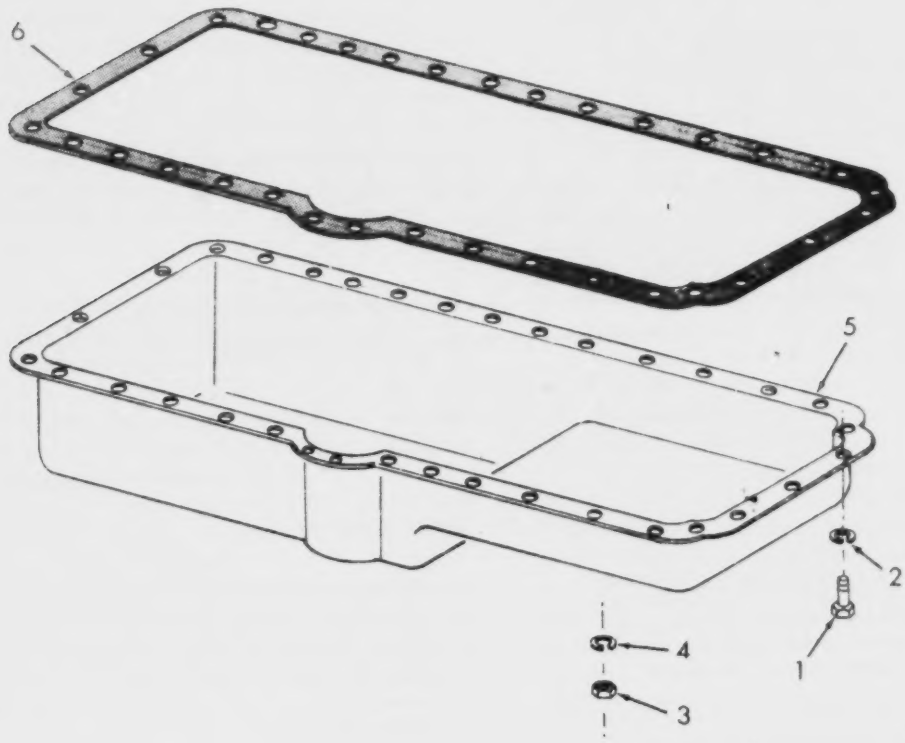
Before proceeding with piston and connecting rod removal, the ridge existing on the cylinder wall at the upper end of the ring travel must be removed by using a ridge reamer. This prevents damage to the piston ring lands during removal of pistons and prevents damage to new top piston rings after the installation of new rings.

(4) Remove screws (1, fig. 3-6), lockwashers (2), and remove the oil and pump (3) from the crankcase.

(5) Remove nuts (1, fig. 3-7) that secure the connecting rod bearing cap (2) to the connecting

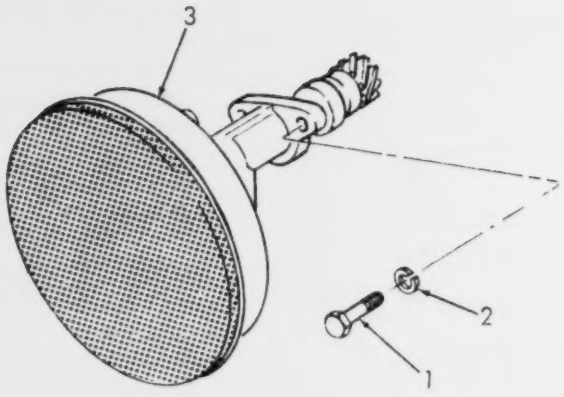
rod. Remove the bearing cap. Matchmark the connecting rod bearing cap and connecting rod.

(6) Push the connecting rod and piston to the top of the cylinder and lift out.



1. Nut
2. Lockwasher
3. Bolt
4. Lockwasher
5. Oil pan
6. Gasket

Figure 3-5. Oil pan



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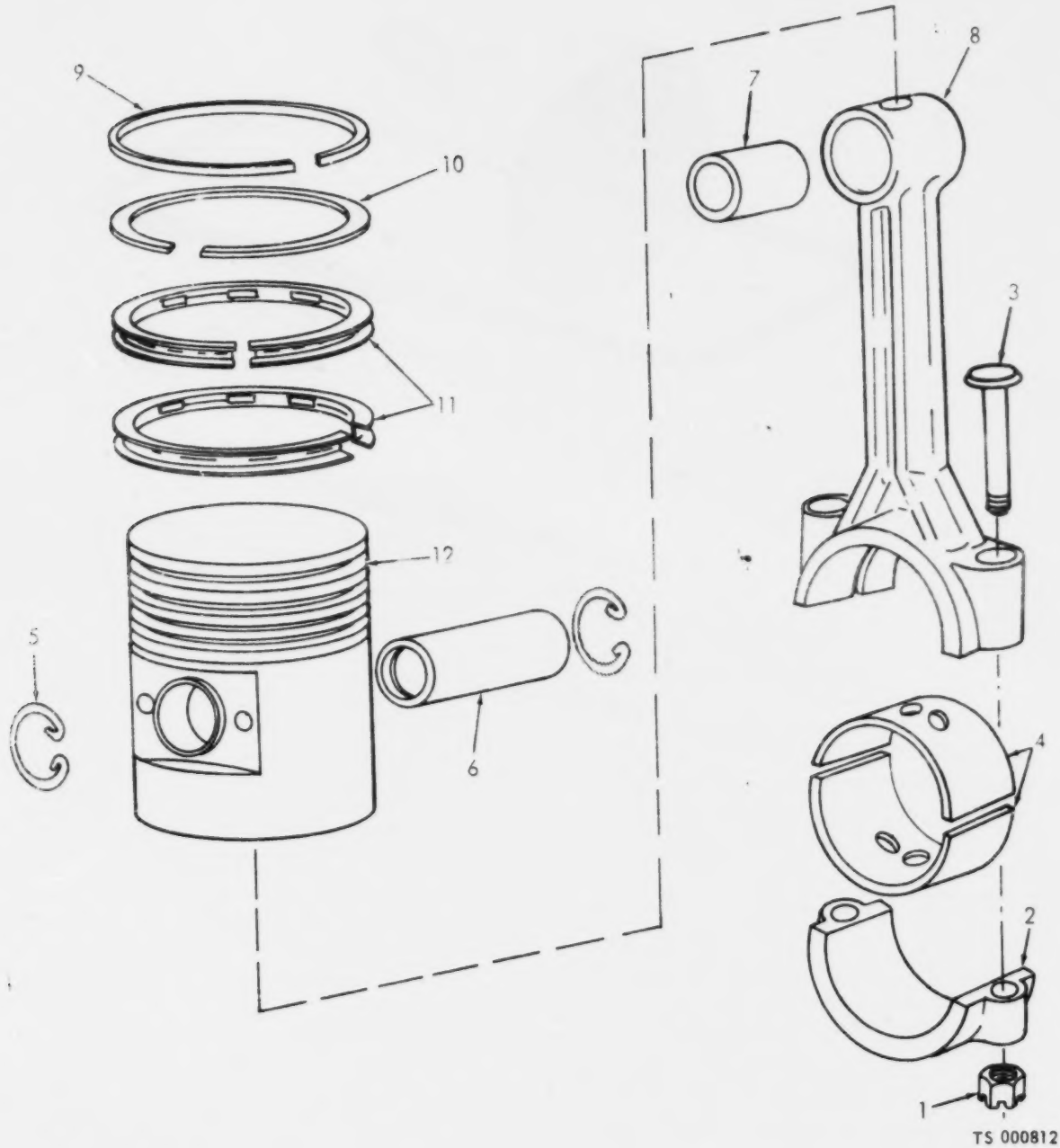
1. Screw
2. Lockwasher
3. Oil pump

Figure 3-6. Oil pump, removal and installation.



1. Nut
2. Bearing cap
3. Connecting rod bolt
4. Connecting rod sleeve bearing
5. Retaining ring
6. Pin, piston
7. Bearing sleeve
8. Connecting rod
9. Compression ring
10. Compression ring
11. Oil ring
12. Piston

Figure 3-7. Piston and connecting rod.

c. Disassembly.

(1) Remove connecting rod bolts (3) from the connecting rod. Remove the sleeve bearing (4) from the connecting rod (8) and connecting rod bearing cap (2).

(2) Remove the retaining rings (5) and using a pin-driving tool, drive the piston pin (6) from the piston and connecting rod. Separate the piston and connecting rod.

(3) Press the sleeve bearing (7) from the connecting rod. Do not remove the sleeve bearing unless it is to be replaced.

(4) Use a piston ring expander and remove compression rings (9) and (10) and oil ring (11) from the piston (12).

d. Cleaning and Inspection.

(1) Clean all parts with cleaning solvent and dry thoroughly.

CAUTION

Do not use a caustic solution for aluminum pistons.

(2) Clean all carbon deposits from the ring grooves of the pistons with a ring groove cleaner.

(3) Inspect the pistons for cracks, breaks, or scores. Check the piston ring grooves and ring lands for wear, by using a new piston ring and feeler gauge (fig. 3-8). If the clearance between the ring and the ring land is excessive (table 1-1), replace the piston.

TS 000813

Figure 3-8. Checking piston ring side clearance.

(4) Inspect the connecting rods and bearings for scores, breaks, bends, or cracks. Replace defective parts.

(a) All connecting rod bearings and piston pin bearings should be replaced at every major overhaul (table 1-1).

(b) Test connecting rods for alignment. Badly twisted or bent connecting rods must be replaced.

(5) Measure the end clearance of each piston ring with the ring installed in the cylinder (fig. 3-9). Push the ring 2 inches into the cylinder bore to place the ring in operating position. The piston ring end clearance for the compression and oil rings should be 0.010 inch to 0.020 inch. If the end clearance is less than 0.013 inch, file the butt end of the ring to increase clearance. If the end clearance is greater than 0.020 inch, replace the piston rings as a set.

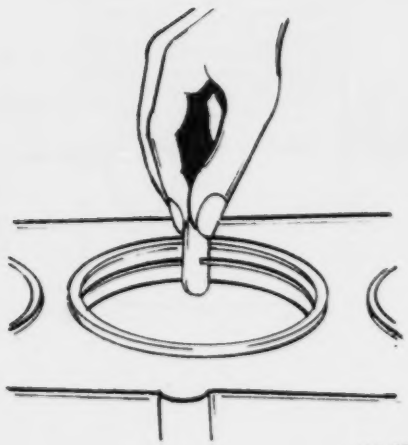


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Figure 3-9. Checking ring end clearance.

(6) Piston to sleeve clearance is probably the most critical dimension in the entire piston fitting sequence. Pistons are sold for re-dimensioned sleeves in 0.010", 0.020" and 0.040" oversizes. Also, they are sold in semi-finished condition for these engines and it is possible for a piston of given oversize to be re-ground to a smaller oversize as needed.

(7) To take the clearance, select a piece of 1/2" wide feeler stock 8 to 10" long and of the desired skirt clearance. Attach the feeler stock to an accurate spring scale as shown in the accompanying illustration. Invert the piston and support it with one hand while holding the feeler and spring scale in the other hand. Place the feeler stock in the sleeve and lower the piston into position in such a manner that the feeler stock is spaced 90° from the piston pin. Hold the piston and withdraw the feeler stock. If the correct clearance is present, the tension required to withdraw, the feeler should read 3-6 pounds on the scale. Too low or too high a scale reading indicates too much or too little clearance.

(8) When fitting a piston to a new or accurately re-sized sleeve, the sleeve inner diameter should be the same at top and bottom. Therefore, the clearance may be taken at either end. In sleeves that have been worn, but not resized, some taper giving extra clearance at the top of the sleeve is likely. In such cases, the clearance must be checked at the bottom of the sleeve where the wear is least and the fit is closest. Remember, the skirt of the piston fits closer than the ring lands. Always check skirt clearance, not land clearance.

(9) Piston pin fitting is a job requiring great precision and pin and piston assemblies are usually sold in matched sets. Oversizes of 0.003" and 0.005" are available, however, if desired. The specified pin clearance will permit a hand "push" fit at ordinary room temperatures.

(10) A pin that is loose enough to drop through the piston by its own weight is ordinarily considered too loose. From the service standpoint, a fit of this variety, if not due to severely worn parts, will cause an engine to be somewhat noisy but will not necessarily impair performance or reduce engine life. Moreover, field experience has shown that even perfectly fitted pins will often "drop" through because of temperature variations at the factory and the point of installation.

(11) If the oversize pins are installed, do not forget to check the fit of the pin in the connecting rod bushing since the new pin will be too snug in a standard rod bushing.

e. Reassembly and Installation (Fig. 3-7)

(1) Install piston pin bearing sleeve (7) in connecting rod (8).

(2) Position the connecting rod inside the piston (12). Align the bearing in the rod bore with the piston pin holes in the piston and push the piston pin (6) completely into position through connecting rod. Install piston pin retaining ring (5).

(3) Using a piston ring expander, install oil rings (11), and compression rings (10) and (9). Position the rings so that the gaps are 90 degree

from the thrust side of the piston (in line with the piston pin bore) and 180 degrees from one gap to another.

NOTE

When installing a piston and connecting rod assembly which was formerly used in the engine, install the assembly in the same cylinder bore or sleeve from which it was removed.

(4) Coat piston, piston ring compressor and cylinder sleeve with engine lubricating oil. Install the ring compressor on piston and insert the piston and connecting rod assembly through the top of the crankcase. Push down on the piston carefully until it is in the bore of the crankcase.

(5) Insert connecting rod sleeve bearings (4) into connecting rod and connecting bearing cap (2). Be sure the sleeve bearings are fully seated, oil holes alined, and the locking tangs on the sleeve bearings fit into the recesses. Apply a film of engine lubricating oil on the sleeve bearings.

(6) Install bearing caps (2) over the crankshaft journals, being sure the matchmark sides of the connecting rod and bearing cap are on the same side.

(7) Install connecting rod bolts (3) and nuts (1). Torque connecting rod bolts to 56-to 58-ft lbs.

(a) *Bearing adjustment.*

1. All main and connecting rod bearings in these engines are of the steel backed, precision type. Because of the extremely close machining of this type of bearing, no fitting, filing, scraping, boring or other adjustment is required or permissible. Replacement must be in complete bearing units. Never replace only one half of a bearing. Service bearings are available in 0.020" and 0.040" undersize for use on reground crankshafts. Never attempt to adjust a bearing by filing, grinding or lapping the bearing cap. The bearing seats are precision bored with the caps in place. Hence, any metal removed from either side forever prevents proper fitting of a connecting rod bearing in the rod, and in the case of a crankcase, makes the entire case unsuited for further use.

2. Be sure that the bearings seat on absolutely clean surfaces and that the back of the bearing is wiped perfectly clean. The slightest bit of dirt or carbon squeezed between the back of a bearing and its seat can cause rapid bearing failure due to a localized high spot.

3. Equally important in obtaining a maximum bearing life is the correct tension on the bearing cap nuts. Pull down on all nuts evenly, going from one side of the bearing to the other. Apply final tension with torque wrench using a slow steady pull and holding the wrench "on torque" for a few seconds when the proper value is reached. Desired torque values will be found in the table of limits at the end of this manual. Previous over-torquing, or some other damage to the bolt or nut is sometimes encountered and will be felt by the torque "softening up" so that the nut can be turned without appreciable increase in wrench tension. Never allow a bolt and nut in this condition to remain in an engine.

4. Crankshaft end thrust is controlled by the flange on the center main bearing on the 180 and the number 3 bearing on the 185 and 190 model engines. Therefore, there is no necessity for adjustment of this at assembly. Excessive end play requires bearing replacement. Always be sure that some end play definitely is present.

(b) *Side clearances.* Although less critical than the bearing running clearances, no bearing should be assembled without checking side clearance. This may be done by forcing the rod fully to one side or the other and inserting feeler between the crankshaft and the bearing end. Shaft end play is measured with a feeler between the shaft flange and the main bearing flange when the shaft is at full forward or rearward position. A dial indicator may also be used for this purpose. Consult the table of limits for the proper clearances.

(c) *Running clearances.*

1. Even in the case of precision bearings, it is good mechanical practice to check running clearances when installing bearings. There are several methods of doing this, some of which are merely checks of whether any clearance exists and others that give an indication of how much clearance is present. The familiar test of connecting rod bearing clearance consists of manually gripping the rod cap after the bearing bolts are tightened and attempting to move the bearing from side to side in the direction of end clearance. A well-fitted bearing is usually just loose enough to be "snapped" from side to side without actually feeling so loose as to push easily. Sometimes a slightly snug bearing will not move under finger pressure but will move readily under light blows from a soft-face hammer. This is usually considered as satisfactory providing the engine is given adequate break-in time. In the final analysis, this test is a matter of judgment and is not altogether suitable for general use.

2. A similar test on main bearings consists of tightening each bearing cap in turn and turning the shaft to detect bind. Again, the differences between tight and "about right" is a matter of judgment.

3. More accurate tests may be carried out with fuse wire or with a special crushing

gauge material that squeezes between the shaft and the bearing to flatten into a measurable gauge.

4. It is emphasized that any unusual bending or run-out in a crankshaft makes it impossible to fit bearings accurately. For this reason, the time spent in making a run-out check at overhaul is well worth while. Also, magnetic inspection of the crankshaft and other stressed parts is recommended if the proper equipment is available.

5. Refer to table 1-1 for rod bearing side and running clearances.

6. Install the oil pump (3, fig. 3-6) into the crankcase and secure with lockwashers (2) and screws (1).

7. Position gasket (6, fig. 3-5) on oil pan (5) and position oil pan on the crankcase. Secure oil pan with lockwashers (4), bolts (3), lockwashers (2), and nuts (1).

8. Refer to paragraph 3-2 and install the cylinder head.

9. Fill the crankcase to the level mark on the gage with the specified grade of lubricating oil.

3-4. Timing Gear Train and Front Cover

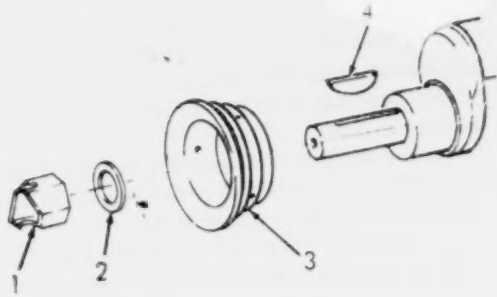
a. General. The gear train consists of the crankshaft gear and camshaft gear. These gears provide a positive and accurate drive for the oil pump, mechanical governor, and distributor. These gears are accessible by removing the crankcase front cover. These gears are punch marked for proper timing and must be in the proper position to have the engine timed correctly.

b. Timing Gear Cover Removal (Fig. 3-10).

(1) Refer to TM 5-3895-275-12 and remove the water pump and fan, governor, and governor control linkage.

(2) Remove starting jaw (1) and flatwasher (2). Using a suitable puller, remove the crankshaft pulley (3) and key (4) from the crankshaft.

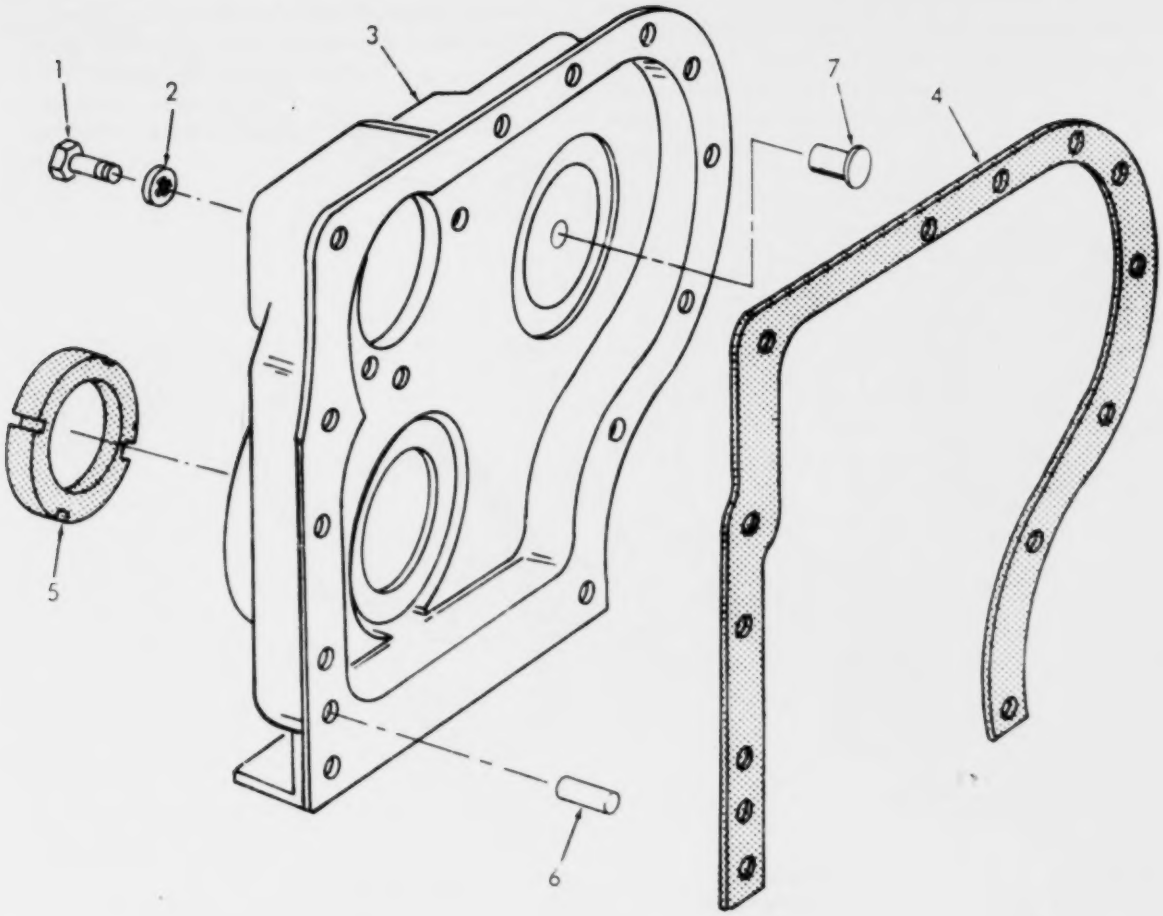
(3) Remove screws (1, fig. 3-11), lockwashers (2), and remove gear cover assembly (3) and gasket (4). Remove oil seal (5), pin (6), and thrust button (7) from gear cover assembly.



TS 000815

1. Starting jaw
2. Flatwasher
3. Pulley
4. Key

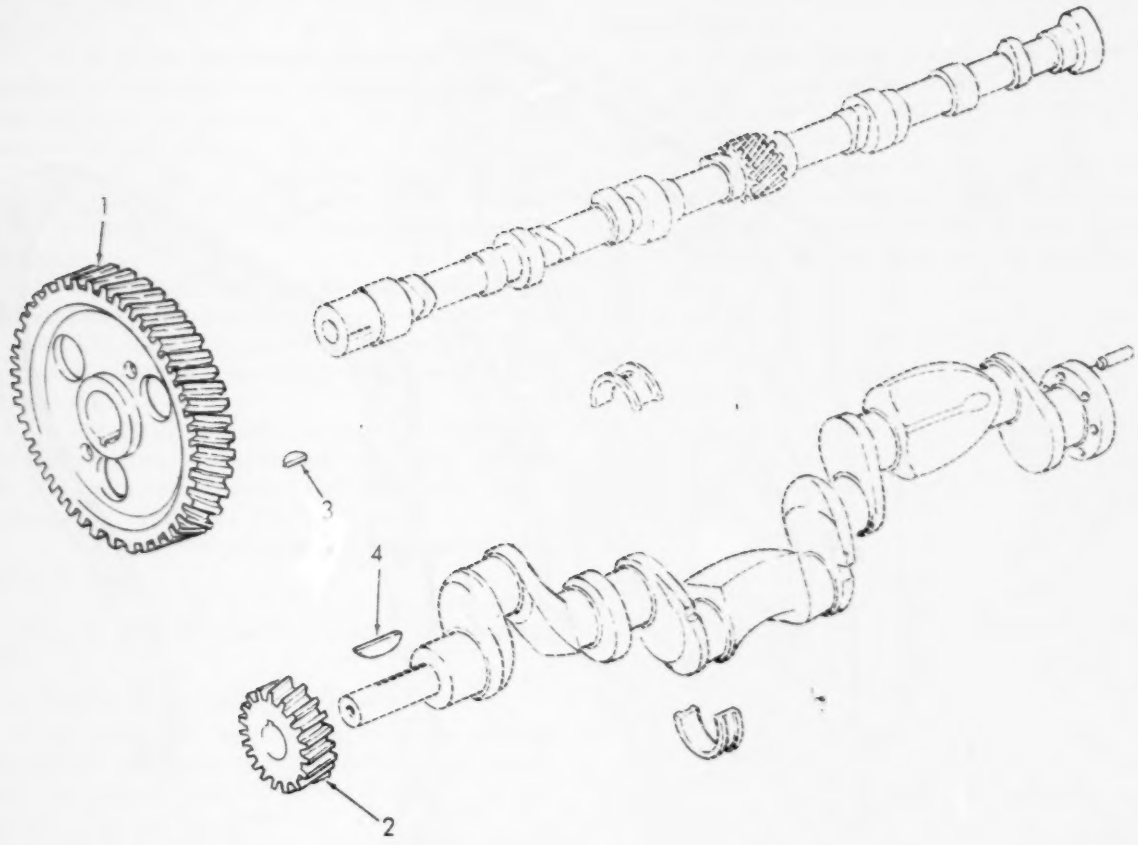
Figure 3-10. Crankshaft pulley.



TS 000816

1. Screw
2. Lockwasher
3. Gear cover assembly
4. Gasket
5. Oil seal
6. Pin
7. Thrust button

Figure 3-11. Gear cover assembly.



TS 000817

1. Camshaft gear
2. Crankshaft gear
3. Key, camshaft
4. Key, crankshaft

Figure 3-12. Camshaft and crankshaft gear.

(4) Using a standard gear puller, remove camshaft gear (1, fig. 3-12) and crankshaft gear (2). Remove camshaft gear key (3) and crankshaft gear key (4).

c. Inspection and Cleaning.

(1) Clean all metal parts with cleaning solvent and dry thoroughly.

(2) Scrape all remaining gasket material and carbon from parts. Use care so as not to damage sealing surface when scraping.

(3) Inspect *crankshaft* and camshaft gears for wear, cracks, or broken teeth. Replace gears if necessary.

(4) Inspect gear cover for cracks or other damage.

(5) Inspect crankshaft pulley for cracks or excessive wear.

d. Installation.

(1) Install camshaft gear key (3, fig. 3-12) in camshaft. Heat the camshaft gear (1) in boiling water and install the gear (with the timing mark facing away from the shaft) on the camshaft.

(2) Install *crankshaft* gear key (4) and install *crankshaft* gear (2), being sure that the timing mark on the camshaft gear is correctly indexed with the timing mark on the crankshaft gear.

(3) Install thrust button (7, fig. 3-11), pin (6), and oil seal (5) into gear cover assembly (3).

(4) Position gasket (4) on gear cover assembly. Install gear cover assembly on the front of crankcase and secure with lockwashers (2) and screws (1).

(5) Install crankshaft pulley key (4, fig. 3-10), and crankshaft pulley (3) on crankshaft. Install flatwasher (2) and starting jaw (3).

(6) Refer to TM 5-3895-275-12 and install the water pump and fan, governor, and governor control linkage.

3-5. Flywheel and Housing

a. General. The flywheel is attached to the rear of the crankshaft. The flywheel, by its inertia, compensates for any fluctuations in engine speed. The cranking motor drive ring gear is a shrink fit on the flywheel and is replaceable.

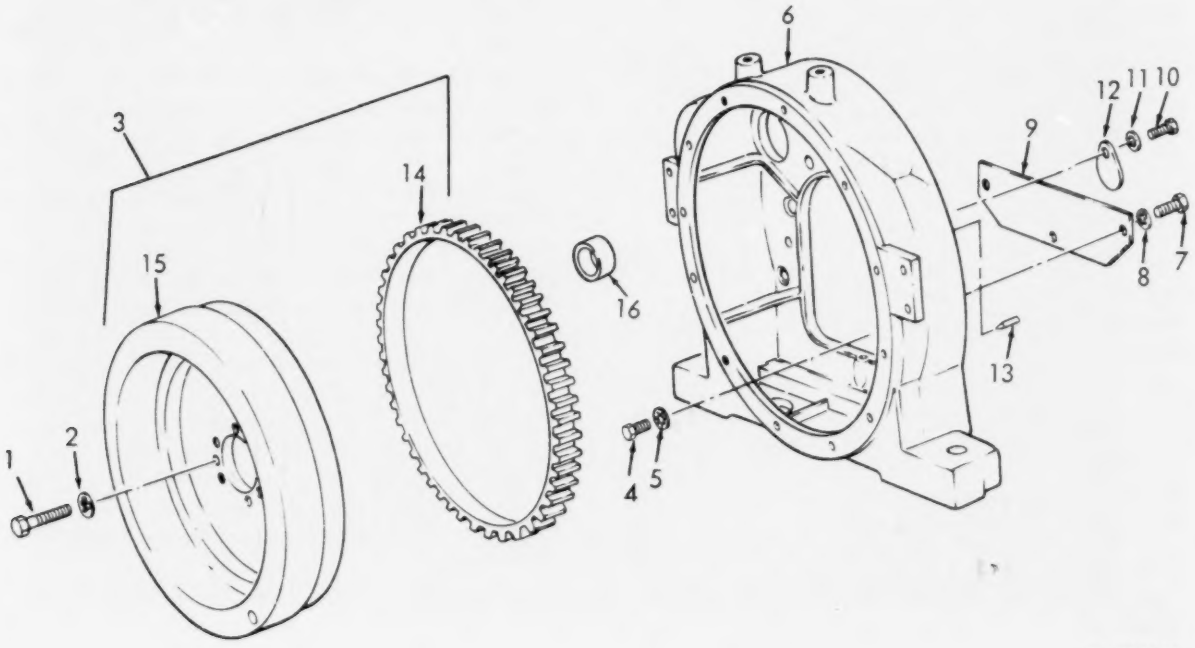
b. Removal (Fig. 3-13).

(1) Refer to paragraph 2-9 and remove clutch assembly.

(2) Remove screws (1) and lockwashers (2), and remove flywheel assembly (3).

(3) Remove bolts (4) and lockwashers (5), and remove flywheel housing (6).

(4) Remove screws (7) and lockwashers (8) and remove plate (9) from flywheel housing. Remove screws (10) and lockwashers (11), and remove timing hole cover (12). Remove pins (13) from crankshaft.



TS 000818

1. Screw
2. Lockwasher
3. Flywheel assembly
4. Bolt
5. Lockwasher
6. Flywheel housing
7. Screw
8. Lockwasher
9. Plate
10. Screw
11. Lockwasher
12. Cover
13. Pin
14. Gear ring
15. Flywheel
16. Pilot bearing

Figure 3-13. Flywheel and housing.

c. Disassembly.

(1) If necessary, ring gear (14) may be removed from flywheel (15), by heating it with a torch and tapping it off with a hammer.

(2) Remove pilot bearing (16) from the flywheel.

d. Cleaning, Inspection and Repair.

(1) Clean all parts with a cleaning solvent and dry thoroughly.

(2) Inspect the flywheel housing and dust plate for cracks, breaks, and warpage. Replace defective parts.

(3) Inspect flywheel ring gear for cracks, breaks, or missing teeth.

(4) Inspect pilot bearing for cracks, breaks, or signs of scoring. Replace a defective bearing.

e. Reassembly. Heat the flywheel ring gear (14) in a hot oil bath and place it onto flywheel (15) while the ring gear is hot. The chamfered edge of the ring gear is placed on the flywheel first, so that when assembled, the chamfered edge faces away from the engine.

f. Replacing the Flywheel Housing. When replacing the flywheel housing, it is suggested

that the flywheel bore and face be checked relative to the crankshaft to establish proper alignment between the engine and clutch. Misalignment between the flywheel housing and engine will cause corresponding misalignment of the clutch and transmission resulting in damage to the clutch plates or pilot bearing and transmission main drive gear or main drive gear pilot bearing. The dowel pins between the crankcase and flywheel housing are for the purpose of maintaining this alignment once the flywheel is mounted within tolerances.

NOTE

The mating surfaces of the crankcase and housing must be inspected and free from foreign material, burs, ridges from nicks, thread pullout, etc. These surfaces must be flat and without assembly projections within the assembly area. Failure to clean mating surfaces will result in excessive face run-out.

(1) Place the flywheel housing (6) over the two flywheel housing-to-crankcase dowels and tap into place with a soft hammer. Install lockwashers (5) and bolts (4) and secure the flywheel housing.

(2) Check the concentricity of the housing bore and the squareness of the face with the crankshaft as described below. Refer to table 1-1 for the proper tolerances. If the concentricity is not within specifications, remove the housing and continue with the next step.

(a) Remove the dowels from the crankcase.

(b) Assemble the flywheel housing to the crankcase. Do not tighten the bolts to full torque. Just run the bolts down snug for housing adjustment.

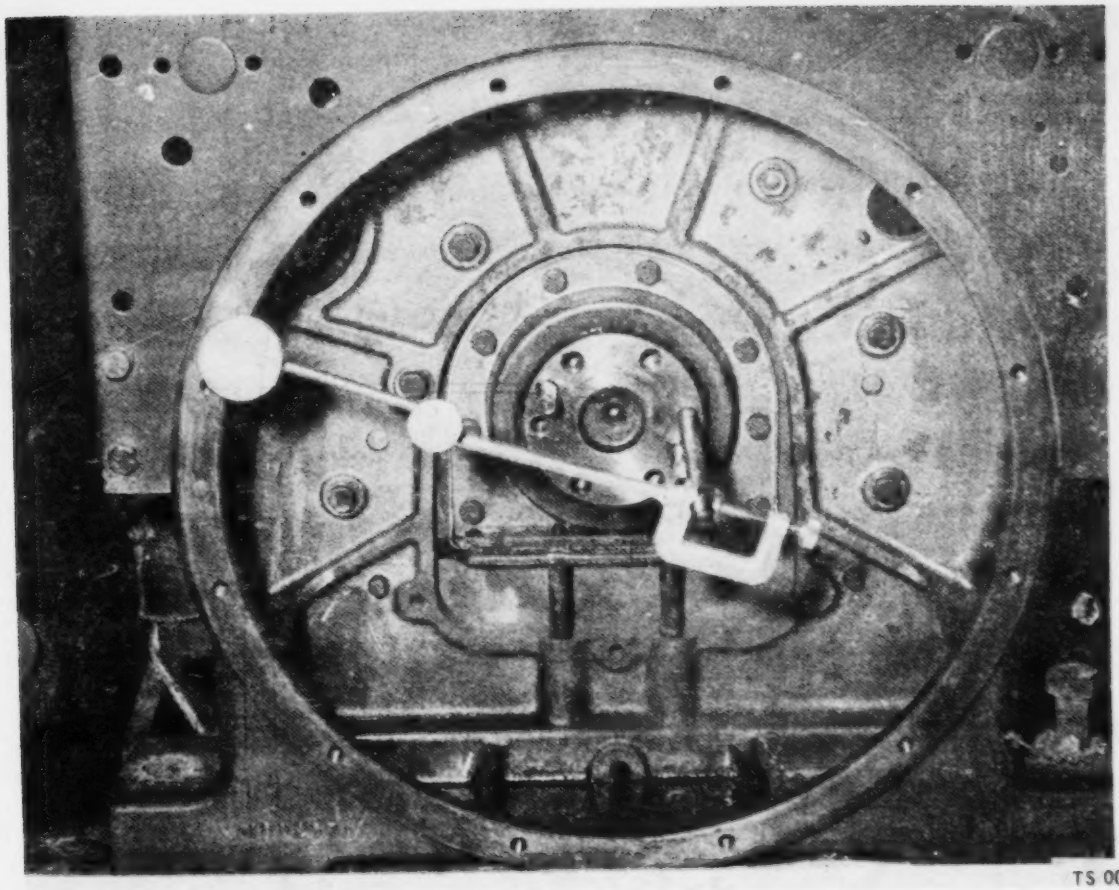
(c) Position the housing to meet the tolerances given in table 1-1.

(d) Tighten all the bolts to full torque. Recheck the flange tolerances and reposition the housing if necessary.

(e) Ream the dowel holes for oversize dowels.

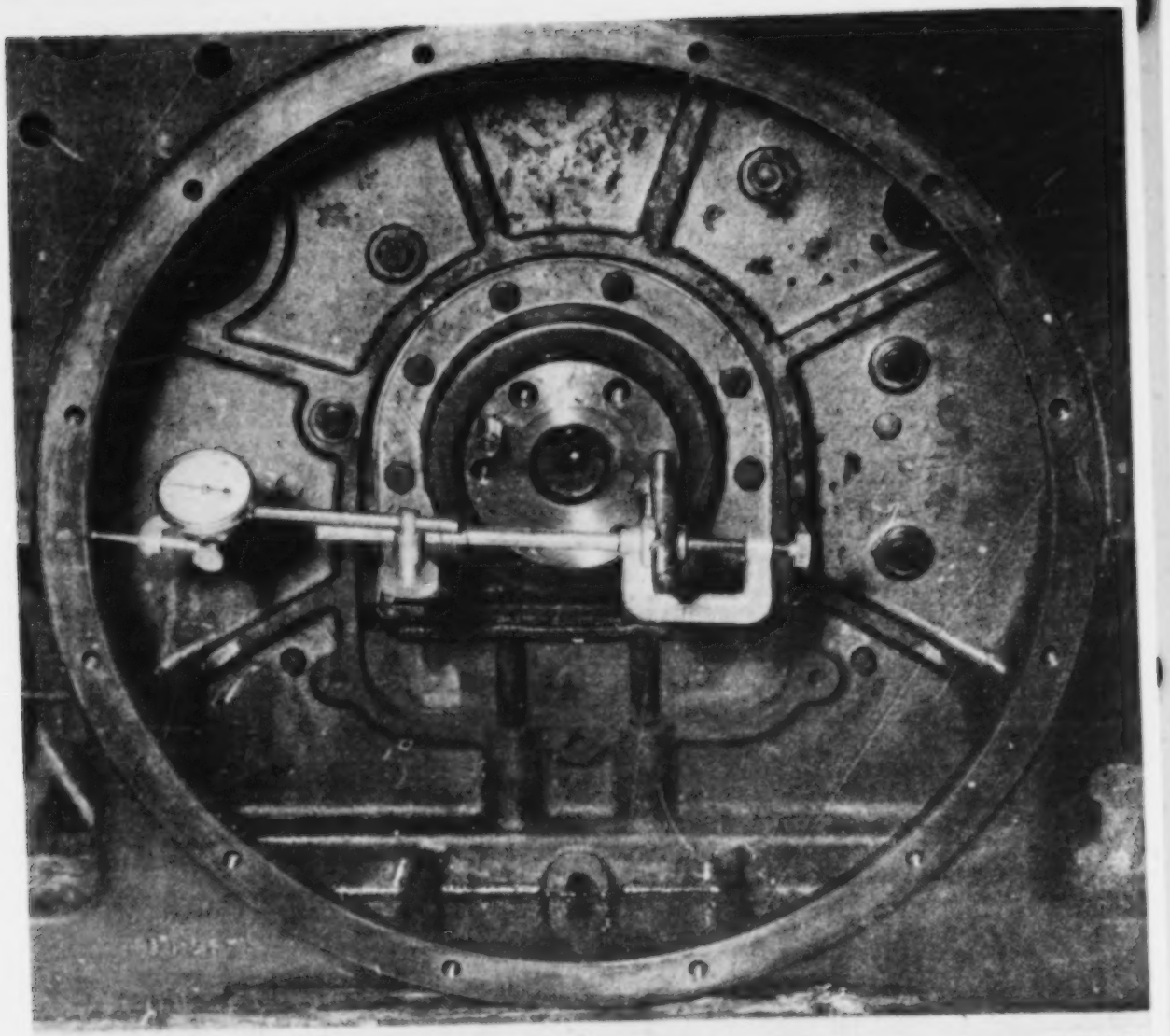
(3) To check the run-out of the flywheel housing face, attach a dial indicator to the crankshaft flange placing the indicator pointer against the flywheel housing face. Remove crankshaft "end-play" and note reading. Check at four points 90 degrees apart for total face variation. Keep crankshaft "end-play" at zero in the same direction for all readings (fig. 3-14). Allowable housing face run-out tolerance is 0.006 inch.

(4) To check concentricity of the flywheel bore relative to the crankshaft axis, attach a dial indicator to the crankshaft placing the indicator pointer against the flywheel housing bore as shown in figure 3-15. Rotate the crankshaft slowly and note total indicator reading variation. Allowable housing bore concentricity tolerance is 0.010 inch.



TS 000819

Figure 3-14. Checking the run-out of the flywheel housing face in relation to the axis of the crankshaft.



TS 000820

Figure 3-15. Checking the concentricity of the flywheel housing bore in relation to the axis of the crankshaft.

g. Installation.

(1) Lubricate the pilot bearing (16, fig. 3-13) and install into the flywheel.

(2) Place the flywheel housing (6) over the two flywheel housing-to-crankcase dowels and tap into place with a soft hammer. Install lockwasher (5) and bolts (4) and secure the housing. Refer to table 1-1 for flywheel housing mounting bolts torque data. If the flywheel housing is new, it will have to be checked out with a dial indicator and aligned. Refer to paragraph 3-5*f*. above.

(3) Install timing hole cover (12) onto flywheel housing and secure with lockwashers (11) and screw (10). Install plate (9) onto flywheel housing and secure with lockwasher (8) and screws (7).

(4) Install the flywheel assembly (3) into position on the dowel in the crankshaft flange. Secure the flywheel assembly with lockwashers (2) and screws (1). Refer to table 1-1 for flywheel assembly mounting screws torque data.

3-6. Oil Pump

a. Removal

(1) Refer to paragraph 2-9 and remove the engine.

(2) Refer to paragraph 3-3 and remove the oil pan and oil pump.

b. Disassembly (Fig. 3-16.

(1) Remove lock wire (1) and remove the oil screen (2).

(2) Remove lock wire (3), screw (4), screw (5), and remove the oil pump cover (6) and gasket (7). Remove pin (8) from the cover.

(3) Remove cotter pin (9), adjusting screw (10), spring (11), and relief valve plunger (12) from the oil pump body.

(4) Exert pressure against idler and driver gears (13 and 21) with thumb so that gears are pushed away from outlet side of pump.

(5) Hold the gears in this position and measure with a feeler gage the clearance between outside diameter of gear and bore in pump body (fig. 3-17). The clearance should be 0.002 inch. If clearance exceeds 0.007 inch, replace the gears and or pump body.

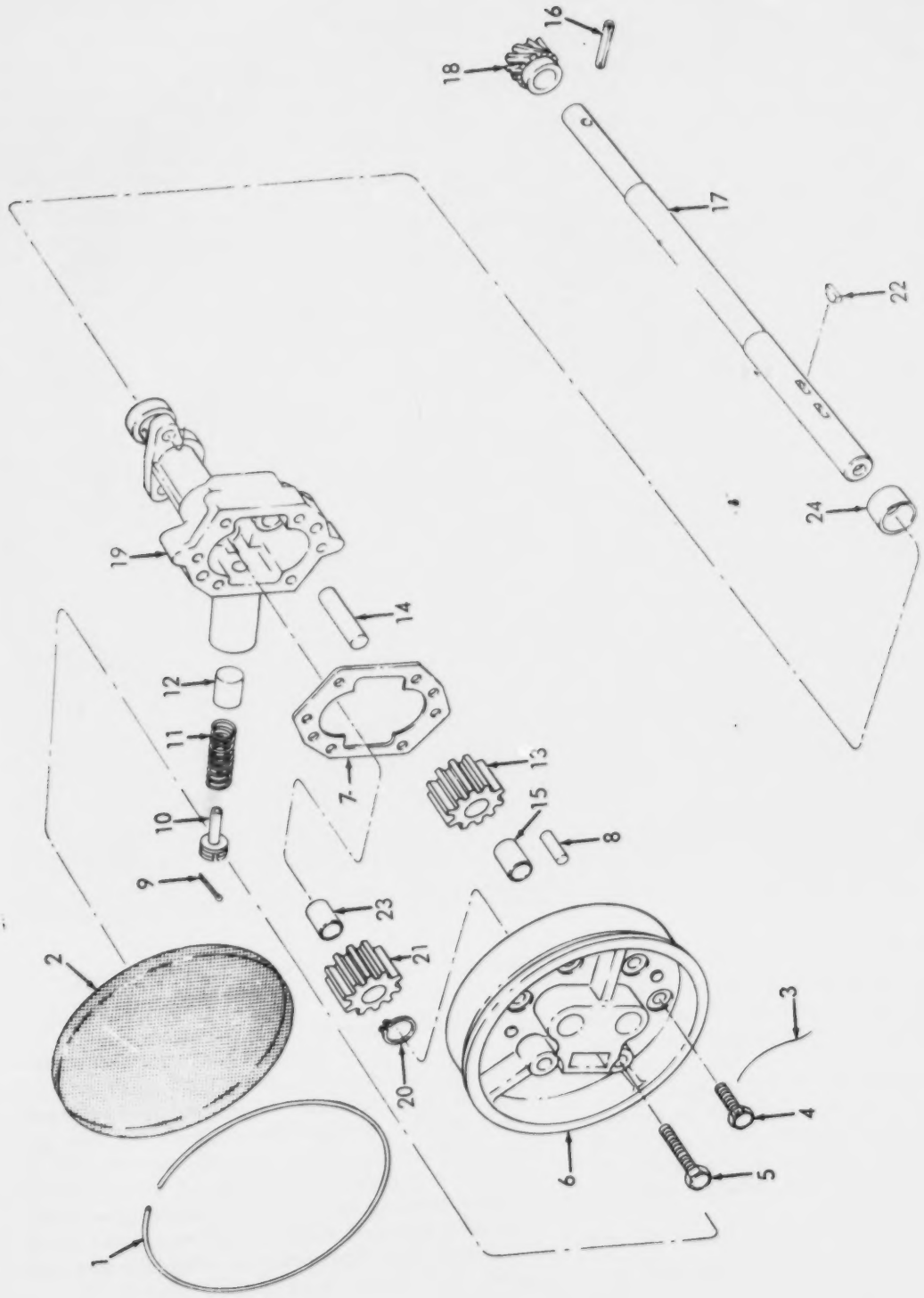
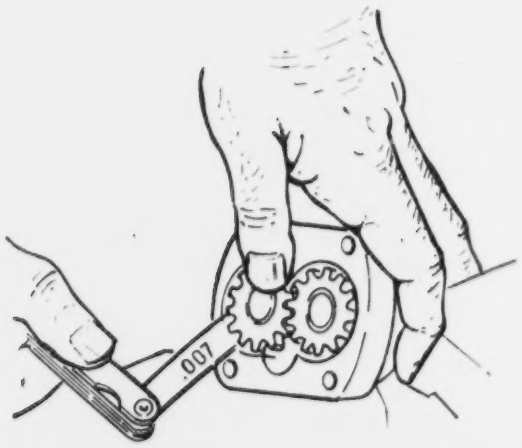


Figure 3-16. Oil pump assembly.

KEY for figure 3-16.

1. Lockwire
2. Oil screen
3. Lockwire
4. Screw
5. Screw
6. Oil pump cover
7. Gasket
8. Pin
9. Cotter pin
10. Adjusting screw
11. Spring
12. Relief valve plunger
13. Idler gear
14. Idler shaft
15. Sleeve bearings
16. Roll pin
17. Drive shaft
18. Drive gear
19. Oil pump body
20. Retaining ring
21. Driver gear
22. Woodruff key
23. Lower sleeve bearing
24. Upper sleeve bearing



TS 000822

Figure 3-17. Measuring pump gear to body clearance.

(6) Measure backlash between driver and idler gears. If clearance exceeds 0.015 inch, replace gears.

(7) Remove the idler gear (13) from the idler shaft (14). Do not remove the sleeve bearings (15) unless they are to be replaced.

(8) Drive out the roll pin (16), and press the drive shaft (17) from the oil pump drive gear (18) and the oil pump body (19).

(9) Remove the retaining ring (20) and press the drive shaft from the driver gear (21). Remove the woodruff keys (22) from the drive shaft.

(10) Press the idler shaft (14) and the lower and upper sleeve bearing (23 and 24), from the oil pump body.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect the oil pump body and cover for cracks or breaks. Replace defective parts.

(3) Inspect the drive and idler shaft for warpage, cracks, or breaks. Replace defective parts.

(4) Inspect all gears for wear, scoring, and chipped teeth. Replace defective parts.

(5) Inspect the sleeve bearings for scoring, pitting, cracks, and breaks. Replace defective parts.

(6) Inspect the oil screen for tears/or cracks. Replace defective parts.

(7) Refer to inspections made during disassembly (5) and (6) in *b* above and replace parts that exceed the tolerances.

d. Reassembly.

NOTE

Lubricate pump and shafts with engine oil when they are being installed in pump body. The pump drive gear and camshaft should be lubricated when pump is installed in crankcase.

(1) Press the lower and upper sleeve bearings (23 and 24) and the idler shaft (14) in the oil pump body (19).

NOTE

When installing pump gears and shafts, these parts should be oiled with engine oil for initial lubrication.

(2) Install the woodruff keys (22) in the drive shaft and press the driver gear (21) on the drive shaft. Secure with retaining ring (20).

(3) Press the drive shaft (17) in the oil pump body (19), and press the oil pump drive gear (18), on the drive shaft. Secure oil pump drive gear to shaft with roll pin (16).

(4) Press sleeve bearing (15) in idler gear (13) and install idler gear on idler shaft (14).

(5) Install relief valve plunger (12), spring (11), adjusting screw (10), in the oil pump body and secure with cotter pin (9).

(6) Install pin (8) in oil pump cover (6). Position gasket (7) and oil pump cover (6) on the oil pump body and secure with screw (5), screw (4) and lock wire (3).

(7) Position oil screen (2) on the oil pump cover and secure with lock wire (1).

e. Installation. Refer to paragraph 3-3 and install the oil pump and oil pan.

3-7. Crankshaft

a. General. The crankshaft is forged of high carbon steel and is carried on main bearings. Special attention must be paid to the end play of the crankshaft, as excessive end play may cause damage to the front main bearings. The crankshaft is drilled for continuous lubrication. It is both statically-and dynamically-balanced.

b. Removal (Fig. 3-18).

(1) Refer to paragraphs (3-3 through 3-5) and remove the oil pan, oil pump, timing gear cover, and flywheel and housing.

(2) Remove main bearing cap screw (1) and washers (2) and remove all crankshaft main bearing caps.

NOTE

Main bearing caps must be returned to their original position.

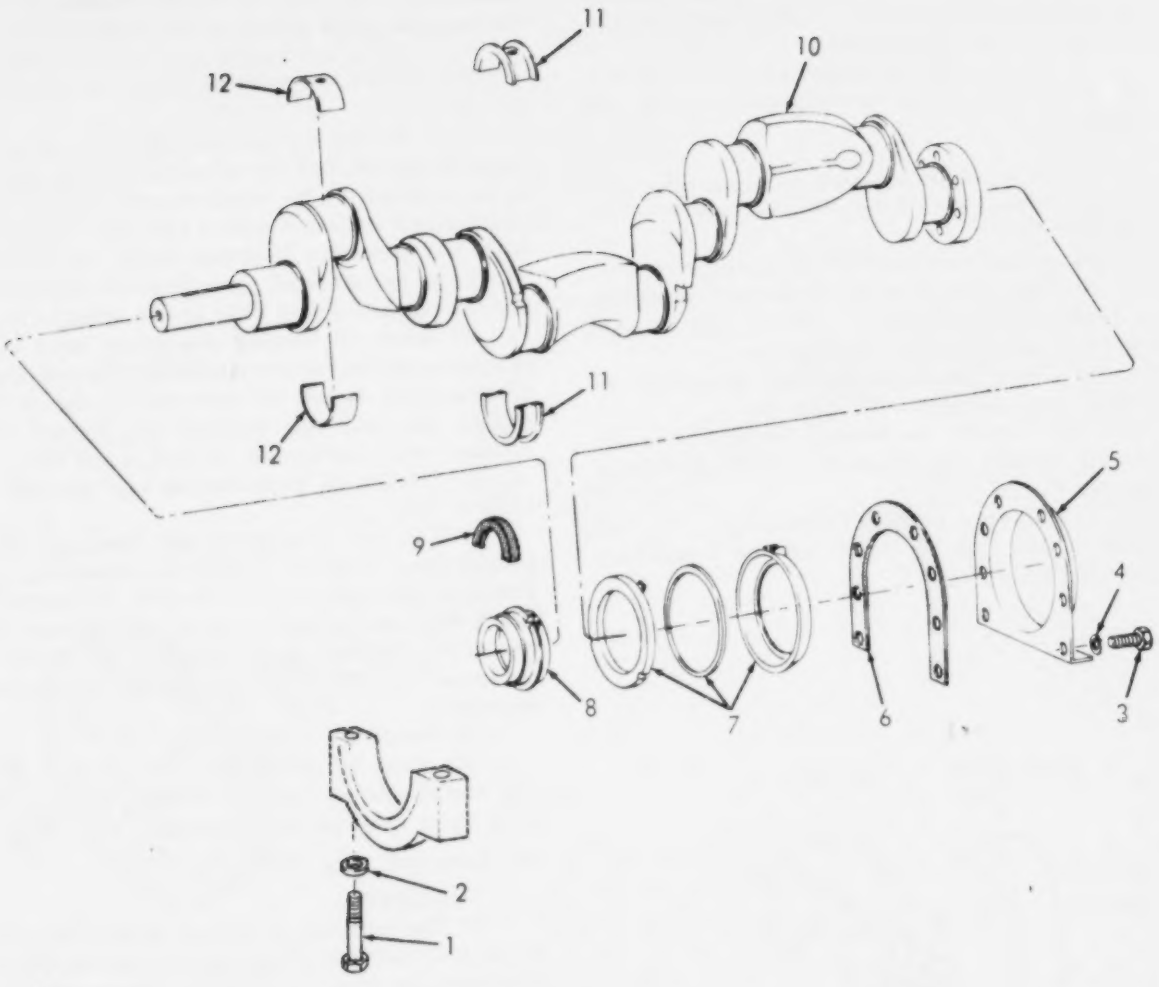
(3) Remove the spark plugs. Remove the connecting rod bearing cap, and push the piston and connecting rod assemblies to the top of their travel.

(4) Remove screw (3), lockwasher (4), and remove seal retainer (5), gasket (6), and rear seal (7).

(5) Remove front seal (8) and gasket (9).

(6) Lift the crankshaft (10) out of the crankcase.

(7) Remove lower and upper bearing halves (11 and 12) from the bearing caps and crankcase.



TS 000823

1. Screw
2. Washer
3. Screw
4. Lockwasher
5. Seal retainer
6. Gasket
7. Rear seal
8. Front seal
9. Gasket
10. Crankshaft
11. Bearing halves
12. Bearing halves

Figure 3-18. Crankshaft.

c. Cleaning and Inspection.

(1) Clean all parts, except seals, with cleaning solvent and dry thoroughly.

(2) Inspect the bearings for wear and evidence of uneven bearing support. If such evidence is present, examine the bearing caps and supporting surfaces of the crankcase for high spots and burs.

(3) Inspect the crankshaft journals for scoring, and measure the diameter of each journal, using a micrometer. Check the dimensions against those specified in table 1-1. Measure each journal at two points, one at right angles to the other, in order to show any tendency of out-of-round. Move the micrometer over the entire width of the journal.

d. Installation.

(1) Wipe all surfaces of the crankshaft

bearing bores of the crankcase and bearing caps free of oil. Place lower and upper bearing halves (11 and 12) in the crankcase and bearing caps. Be sure the bearing halves are fully seated, oil holes are in alignment, and the locking tangs on the bearings fit into the recesses.

(2) Apply a film of engine oil on the bearing halves and place the crankshaft (10) into the crankcase.

NOTE

When installing the crankshaft, be sure to index the timing marks on the crankshaft gear and camshaft gear.

(3) Install the front seal (8) and gasket (9).

(4) Place main bearing caps over crankshaft in their correct sequence. Install, but do not tighten, capscrews and lockwashers.

(5) Check the main bearing clearances as follows and compare with table 1-1.

(a) Remove the bearing cap and wipe the bearing surface and exposed half of crankshaft journal free of oil.

(b) Place a piece of "Plastigage," the full width of the bearing insert, on one crankshaft journal (fig. 3-19).

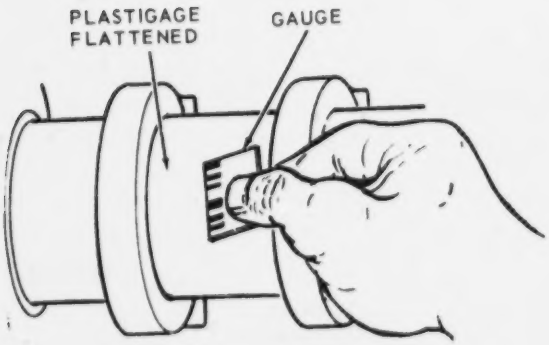


Figure 3-19. Using "Plastigage" method of checking bearing clearance.

(c) Reinstall the bearing cap and tighten the self-locking capscrews to the recommended torque (table 1-1).

(d) Remove the bearing cap. The flattened plastic material will be found adhering to either the bearing shell or the crankshaft.

(e) To determine the bearing clearance, compare the width of the flattened plastic material at its widest point with the graduations on the envelope. The number within the graduation on the envelope indicates the clearance in thousandths of an inch.

NOTE

Do not turn the crankshaft during the above procedure.

(f) Should the readings not fall within the specified limits, and the torque wrench is known to be accurate in its measurement, remove the bearing and replace it with a new one. However, with the precision bearings used, no trouble should be encountered providing the crankshaft and/or crankcase and caps are in good order.

(6) After all bearing clearances have been checked and just before reinstalling the rear main bearing caps, install the rear seal (7, fig. 3-18), gasket (6), and seal retainer (5). Secure seal retainer with lockwasher (4) and screw (3).

(7) Torque all main bearing caps to 1300-to 1350-in. lbs.

(8) Oil the connecting rod bearings after wiping them clean and install the connecting rod bearings and caps to the crankshaft. Be sure that the correct cap is located on its rod. Torque the connecting rod bolts to 675 to 700 in. lbs. Refer to paragraph 3-3 and check connecting rod bearing clearance.

(9) Install the spark plugs.

(10) Refer to paragraphs (3-3 through 3-5) and install the oil pan, oil pump, timing gear cover, and flywheel and housing.

3-8. Camshaft (Fig. 3-20)

a. Description.

(1) The camshaft is located in the crankcase on the left hand side of the engine, and it is held to the crankcase by a thrust plate. The camshaft is supported at intervals along its length by four bushings. The bushings are removable and are furnished for replacement reamed to size. The bushings are press fit in the crankcase.

(2) The camshaft drives the engine lubricating oil pump by the gear located approximately in the center of the shaft. The camshaft has the main function of operating the intake and exhaust valve mechanism by action of its lobes upon the push rods during rotation.

b. Removal.

(1) Refer to TM 5-3895-275-12, and remove the distributor, fuel pump, governor and the water pump.

(2) Refer to paragraph 3-3, and remove the oil pan and oil pump.

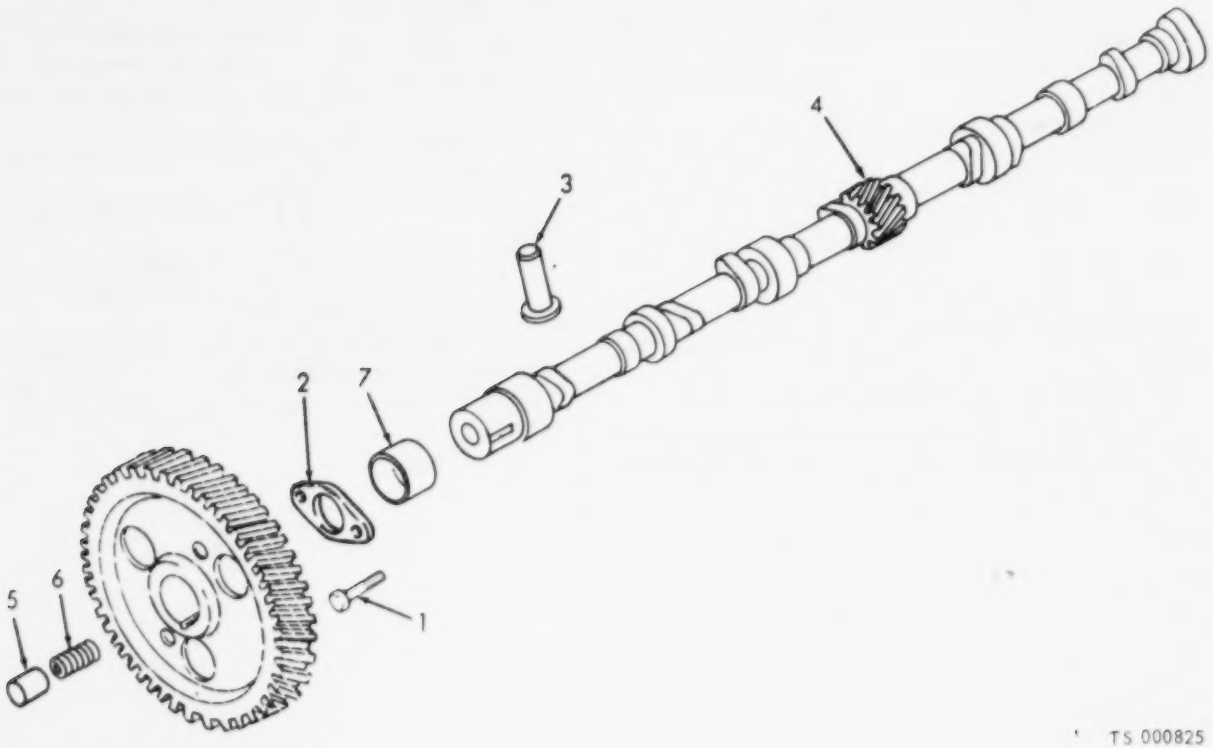
(3) Refer to paragraph 3-4, and remove the crankcase front cover.

(4) Refer to paragraph 3-2, and remove the valve mechanism and valve push rods.

(5) Remove screw (1), and thrust plate (2). Raise valve lifter (3) in the crankcase so camshaft (4) can be removed.

(6) Remove thrust button (5) and spring (6) from the camshaft.

(7) Press or drive front sleeve bearing (7) from the crankcase. Do not remove sleeve bearing unless it is to be replaced.



1. Screw
2. Thrust plate
3. Valve lifter
4. Camshaft
5. Thrust button
6. Spring
7. Sleeve bearing

Figure 3-20. Camshaft.

c. *Inspection and Repair.*

(1) Clean all parts in cleaning solvent and dry with compressed air. As inspection is completed, coat each part with clean engine oil and store safety until reassembly.

(2) Inspect the camshaft journals for wear. Dimensions for the camshaft journals are given in table 1-1. Compare the dimensions of the camshaft being serviced with the dimensions listed. Inspect for signs of wear or out-of-round condition. If wear or out-of-round is excessive, replace the camshaft.

(3) Inspect the camshaft lobes, if chipped or scored, replace the camshaft. If the lifting areas of the cam lobes, when compared with a new camshaft, show amounts of wear, the camshaft should be replaced.

(4) Inspect the oil pump drive gear. If the gear teeth are worn or damaged, the camshaft must be replaced.

(5) Inspect the camshaft bearings and determine the running clearance. If camshaft bushing replacement is necessary, remove and install new bushings with the special camshaft bushing tool.

(6) Inspect the tappets. Replace any worn, chipped, or scratched tappets. If the tappet face is badly spalled, extreme wear can be expected on

the cam lobe, possibly requiring replacement of the camshaft.

d. Installation.

(1) Press on drive sleeve bearing (7) in the crankcase. Be sure the oil hole in the sleeve bearing is alined with the drilled passage in the crankcase.

(2) Install valve lifters (3) in the crankcase. Raise valve lifters in crankcase and install camshaft.

(3) Install spring (6) and thrust button (5) in the camshaft.

(4) Install thrust plate (2) and secure with screw (1).

(5) Refer to paragraph 3-4 and install the crankcase front cover.

(6) Refer to paragraph 3-3, and install the oil pump and oil pan.

(7) Refer to paragraph 3-2, and install the valve mechanism and valve push rods.

(8) Refer to TM 5-3895-275-12, and install the governor, distributor, fuel pump, and water pump.

3-9. Crankcase and Cylinder Sleeves

a. General. The crankcase and cylinder block are cast as a single unit, with the water jacket extended the full length of the cylinders. The crankcase has an oil header, and extending from this header are drilled passages that carry oil under pressure to the crankshaft bearings, camshaft bearings, rocker arm assemblies, and the timing gears. The wet-type cylinder sleeves fit in the cylinder bores with a light-press fit.

b. Removal.

(1) Refer to TM 5-3895-275-12 and remove the engine accessories.

(2) Remove the cylinder head (para 3-2).

(3) Remove the oil pump (para 3-6).

(4) Remove the pistons and connecting rods (para 3-3).

(5) Remove the timing gear train and front cover (para 3-4).

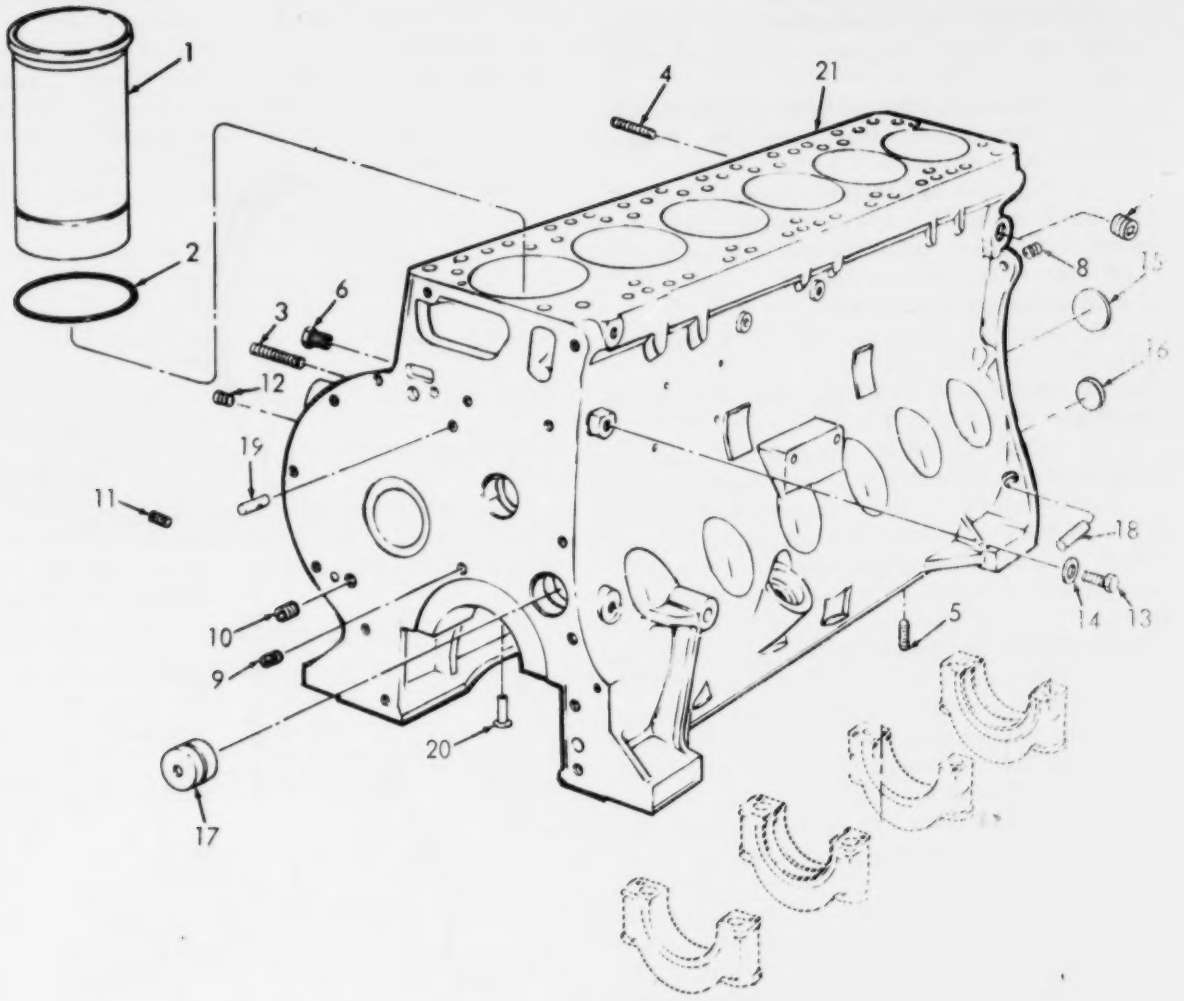
(6) Remove the flywheel and housing (para 3-5).

(7) Remove the crankshaft (para 3-7).

(8) Remove the camshaft (para 3-8).

c. Disassembly (Fig. 3-21).

(1) Use a block of wood or a suitable driver and remove the cylinder sleeves (1) from the crankcase. Remove ring (2) from the cylinder sleeves.



1. Cylinder sleeve
2. Ring
3. Stud
4. Stud
5. Stud
6. Pipe plug
7. Pipe plug
8. Pipe plug
9. Pipe plug
10. Pipe plug
11. Pipe plug
12. Pipe plug
13. Pipe plug
14. Flatwasher
15. Expansion plug
16. Expansion plug
17. Cup plug
18. Pin
19. Tube
20. Oil restrictor
21. Crankcase

Figure 3-21. Crankcase and cylinder sleeves.

(2) Remove studs (3, 4, and 5) from the crankcase.

(3) Remove pipe plugs (6, 7, 8, 9, 10, 11, and 12) from the crankcase. Remove pipe plug (13) and flatwasher (14) from the crankcase.

(4) Remove expansion plugs (15) and (16) from the crankcase. Remove idler hole cup plug (17) from the crankcase.

(5) Remove pin (18) and tube (19) from the crankcase.

(6) Remove oil restrictor (20) from the crankcase (21).

d. Cleaning, Inspection and Repair.

(1) Clean the crankcase with cleaning solvent and steam.

(2) Clean the oil header and drilled passages

with a wire brush and a suitable rod. Blow passages out with compressed air.

(3) Inspect the crankcase for warpage, cracks, and breaks. Replace a defective crankcase.

(4) Inspect all other parts for cracks, breaks, stripped threads, or other damage. Replace defective parts.

(5) Measure the inside diameter of the cylinder sleeves. If a cylinder sleeve exceeds 4 inches in diameter, or is out-of-round or tapered more than 0.003 inch, replace it.

e. Reassembly (Fig. 3-21).

(1) Install oil restrictor (20) in the crankcase (21).

(2) Install tube (19) and pin (18) in the crankcase.

(3) Install idler hole cup plug (17) and expansion plugs (16 and 15) in the crankcase.

(4) Install flatwasher (14) and pipe plug (13) in the crankcase. Install pipe plugs (12, 11, 10, 9,8, 7, and 6) in the crankcase.

(5) Install studs (5, 4 and 3) in the crankcase.

(6) There are several important points to note on installing the sleeves (1). First in importance is the use of seal rings (2) that are fresh and elastic. Do not use aged and hardened rings since these will not compress evenly and sleeve distortion will result. Also, the ring seating surfaces must be clean and well lubricated with liquid soap. Do not use engine oil on rubber rings. After slipping the rings over the sleeve and into the grooves, run a pencil or like instrument around under the ring to distribute the rubber material around the sleeve more evenly (fig. 3-22).

(7) After the rubber rings and surrounding area are well soaped, align the sleeve in the crankcase and force it into the crankcase with a firm thrust of the hands. Heavy hammering or driving is unnecessary and undesirable.

(8) When all sleeves are in place, it is good practice to check the sleeve bores for distortion that might have occurred due to inaccurate placement of the seal ring material. This can be done with a clamping load on the top of the sleeve and a dial indicator of the extension arm, three-contact type (fig. 3-23).

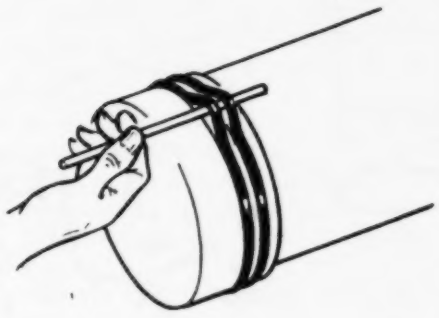


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Figure 3-22. Evening up rubber seal rings.

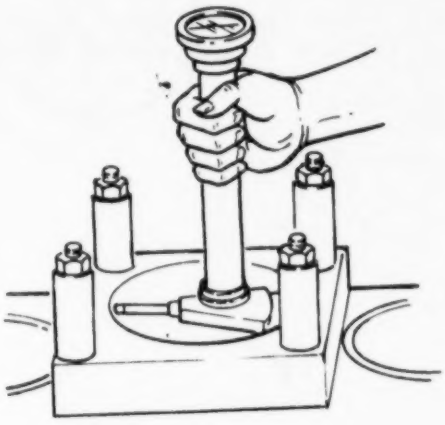

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Figure 3-23. Checking sleeve for distortion.

(9) The clamping action may be obtained from any accurately built ring that simulates the cylinder head pressure and is retained by the head studs. If a considerable number of sleeves are to be replaced over a period of time, it may prove convenient to make up a clamping tool from a

discarded cylinder head with openings cut out to allow the gauge to drop through the cylinder.

(10) It is not unusual when fitting this type of sleeve to find it necessary to withdraw the sleeve, resoap and even up the rings, and reinstall it several times before obtaining an out-of-round reading with the limits of 0.001"—0.002". Uneven distribution of the rubber rings causes this trouble. Always make this check in the seal ring area.

f. Installation.

(1) Install the camshaft (para 3-8).

(2) Install the crankshaft (para 3-7).

(3) Install the flywheel and housing (para 3-5).

(4) Install the timing gear train and front cover (para 3-4).

(5) Install the pistons and connecting rods (para 3-3).

(6) Install the oil pump (para 3-6).

(7) Install the cylinder head (para 3-2).

(8) Refer to TM 5-3895-275-12 and install the engine accessories.

3-10. Clutch Assembly (Fig. 3-24)

a. General. The master clutch is a single plate, dry-disc type clutch mounted to the engine flywheel housing.

b. Removal. Refer to paragraph 2-9 and remove the clutch assembly.

c. Disassembly.

(1) Remove setscrew (1), bushing (2), and remove sheave (3). Remove lubrication fittings (4 and 5).

(2) Remove screw (6), and lockwasher (7), and remove plate (8) and gasket (9).

(3) Remove nut (10), key washer (11), plate (12), spring (13), and key (14). Remove drive plate (15) and floating plate (16).

(4) Remove cotter pin (17), pin (18), cotter pin (19), pin (20), connector link (21), and lever link (22).

(5) Remove pin (23), spring (24), and adjusting yoke (25).

(6) Remove screw (26), lockwasher (27), and drive shaft (28) from clutch housing (42). Remove woodruff keys (29), and clutch throw-out yoke (30).

(7) Remove sliding sleeve (31) and collar assembly (32).

(8) Remove screw (33), lockwasher (34), lock (35), and bearing retainer (36). Remove spacer (37).

(9) Remove lubrication fitting (38), key (39), and shaft (40). Use a suitable puller and remove bearing (41) from shaft.

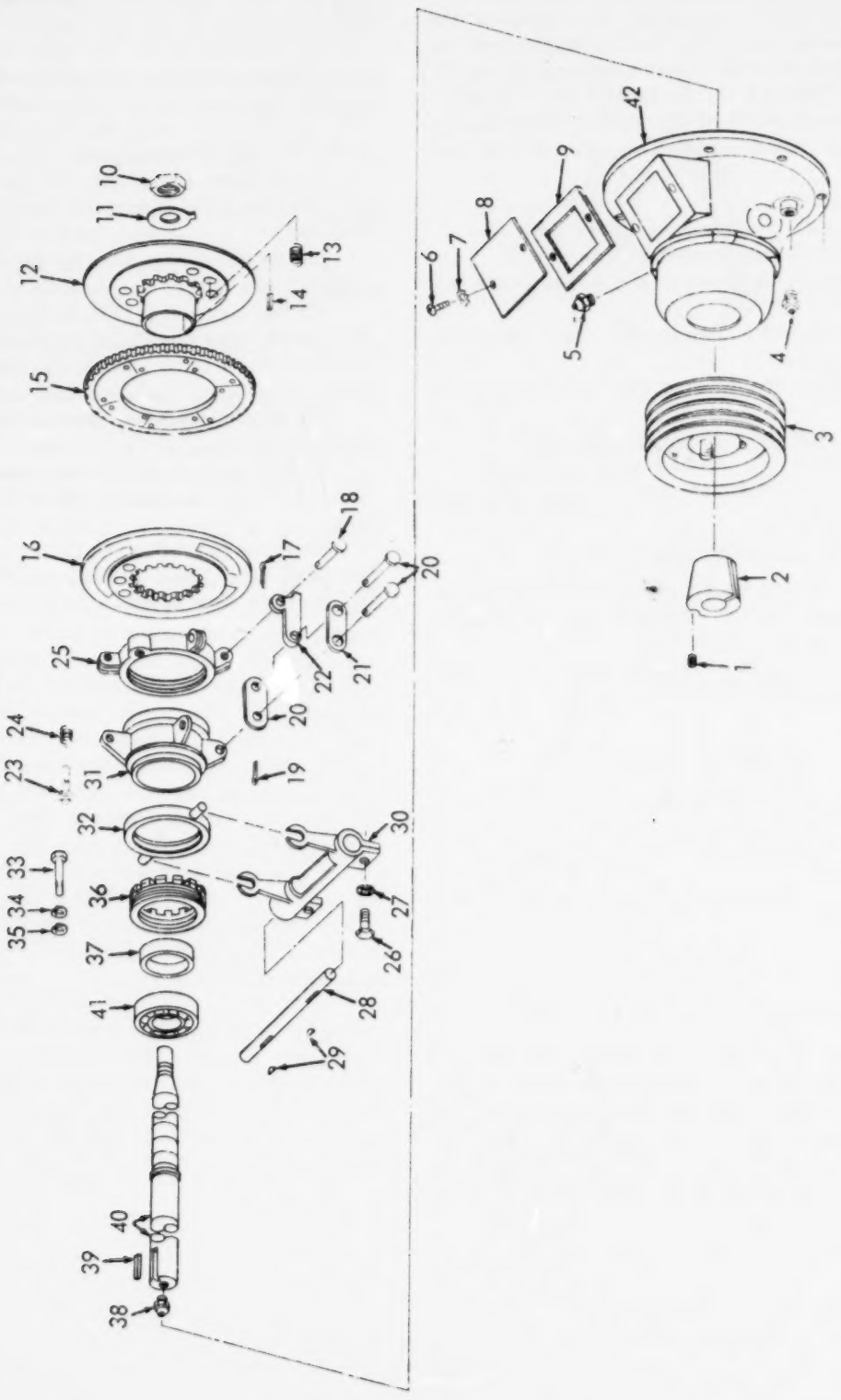


Figure 3-24. Engine clutch assembly.

KEY for figure 3-24

1. Setscrew
2. Bushing
3. Sheave
4. Lubrication fitting
5. Lubrication fitting
6. Screw
7. Lockwasher
8. Plate
9. Gasket
10. Nut
11. Key washer
12. Plate
13. Spring
14. Key
15. Drive plate
16. Floating plate
17. Cotter pin
18. Pin
19. Cotter pin
20. Pin
21. Connector link
22. Lever link
23. Pin
24. Spring
25. Adjusting yoke
26. Screw
27. Lockwasher
28. Shaft
29. Woodruff key
30. Throw-out yoke
31. Sliding sleeve
32. Collar assembly
33. Screw
34. Lockwasher
35. Lock
36. Bearing retainer
37. Spacer
38. Lubrication fitting
39. Key
40. Shaft
41. Bearing
42. Clutch housing

d. Cleaning, Inspection and Repair.

(1) Clean all parts with a cleaning solvent.

(2) Inspect clutch drive and floating plates for cracks, breaks, or wear. Replace a damaged plate.

(3) Inspect bearings for cracks, breaks, or excessive wear. Replace worn or damaged bearings.

(4) Inspect shifter yoke for cracks, breaks, or excessive wear.

(5) Inspect clutch housing for cracks or breaks.

e. Reassembly.

(1) Install bearing (41) on shaft (40) and install shaft in clutch housing (42). Install lubrication fitting (38) in end of shaft.

(2) Install spacer (37), bearing retainer (36), and lock (35), and secure lock with lockwasher (34), and screw (33).

(3) Install shaft (28), woodruff keys (29), and clutch throw-out yoke (30), in clutch housing. Install screw (26) and lockwasher (27).

(4) Install collar assembly (32) and sliding sleeve (31).

(5) Install adjusting yoke (25), spring (24), and pin (23).

(6) Install lever link (22), connector link (21), pin (20), cotter pin (19), pin (18), and cotter (17).

(7) Install floating plate (16), driving plate (15), key (14), spring (13), and plate (12), and secure with key washer (11) and nut (10).

(8) Install gasket (9) and plate (8) on clutch housing and secure with lockwasher (7) and screw (6).

(9) Install key (39), lubrication fittings (4 and 5), and sheave (3). Secure sheave with bushing (2) and setscrew (1).

f. Installation.

(1) Refer to paragraph 2-9 and install the clutch assembly.

(2) Refer to TM 5-3895-275-12, paragraph 4-71, and adjust the clutch assembly.

3-11. Engine Speed Governor (Fig. 3-25 and 3-26)

a. General. The centrifugal, flyweight-type governor automatically controls engine speed after the desired speed is selected with the hand throttle.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-30, and remove the governor.

c. Disassembly.

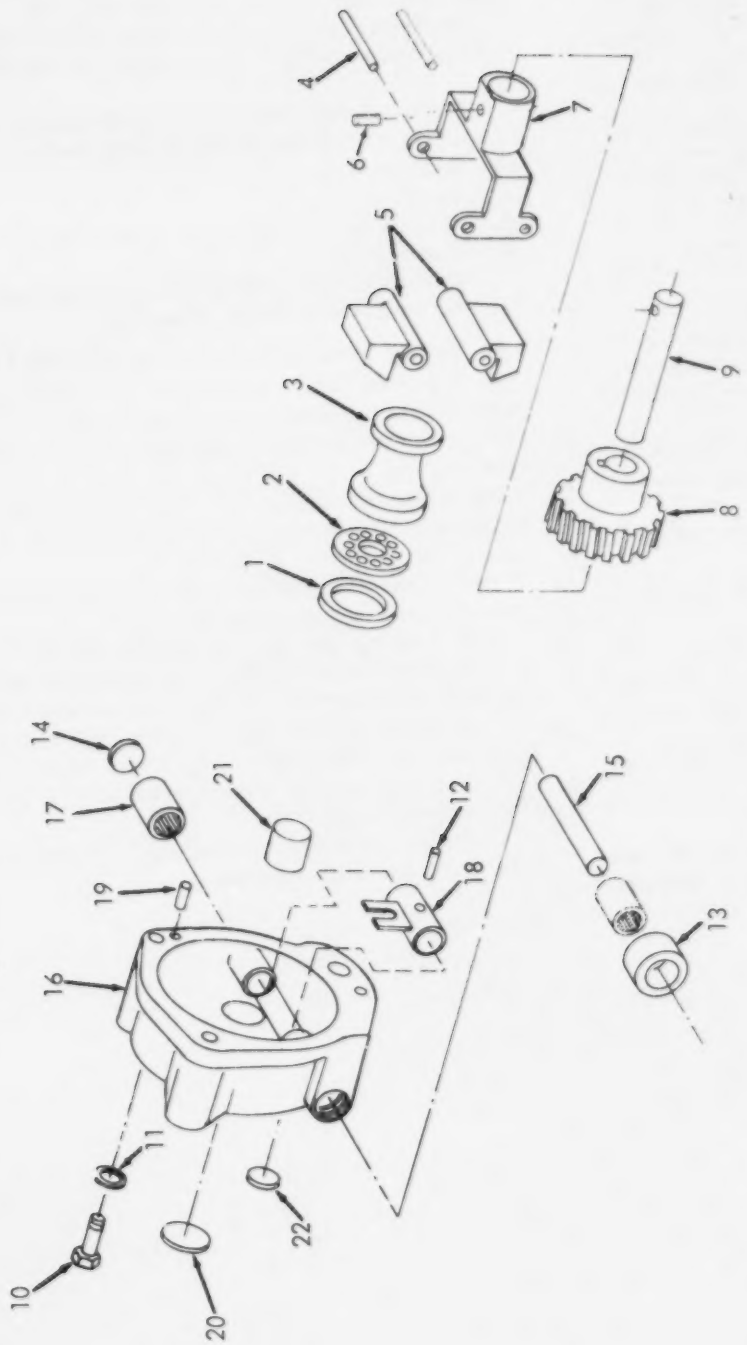
(1) Remove thrust washer (1), retainer and balls (2), and thrust spool (3).

(2) Remove pin (4) and weight (5).

(3) Remove roll pin (6). Use a suitable press and remove spider (7) and gear (8) from shaft (9).

(4) Remove screw (10), washer (11), roll pin (12), seal (13), and plug (14). Drive shaft (15) from housing (16) and remove bearing (17), yoke (18), and pin (19).

(5) Remove plug (20), bearing (21), and plug (22), from governor housing.



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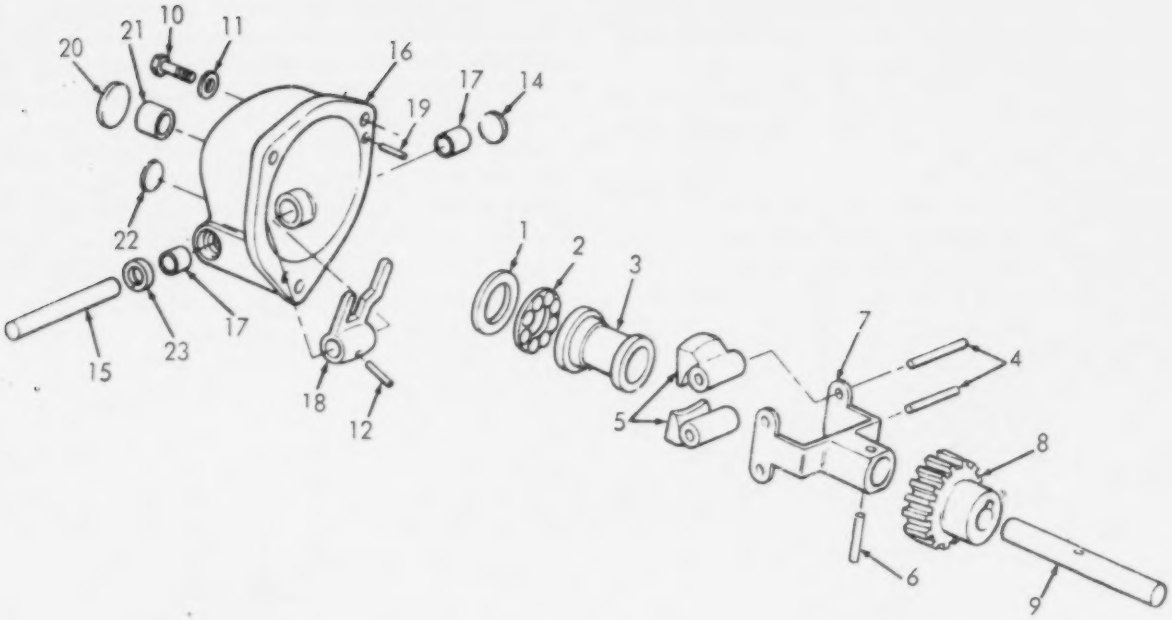
KEY for figure 3-25.

1. Thrust washer
2. Retainer and balls
3. Thrust spool
4. Pin
5. Weight
6. Roll pin
7. Spider
8. Gear
9. Shaft
10. Screw
11. Washer
12. Roll pin
13. Seal
14. Plug
15. Shaft
16. Housing
17. Bearing
18. Yoke
19. Pin
20. Plug
21. Bearing
22. Plug



TS 000831

1. Thrust washer
2. Retainer and balls
3. Thrust spool
4. Pin
5. Weight
6. Roll pin
7. Spider
8. Gear
9. Shaft
10. Screw
11. Washer
12. Roll pin
13. Seal
14. Plug
15. Shaft
16. Housing
17. Bearing
18. Yoke
19. Pin
20. Plug
21. Bearing
22. Plug
23. Seal

Figure 3-26. Governor assembly (Serial No. SA35X339 thru SA35X348).

d. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect the governor yoke, governor weights, and governor weight spider for cracks, breaks, and scoring. Replace defective parts.

(3) Inspect the governor drive gear and shaft for cracks, breaks, scoring, and broken gear teeth. Replace defective parts.

(4) Inspect the retainer and balls, thrust washer, and thrust spool for cracks, breaks, and scoring. Replace defective parts.

e. Reassembly.

(1) Install bearing (21) and plug (20) in governor housing (16).

(2) Press bearing (17) into governor housing. Drive oil seal (13) into governor housing and install plug (14).

(3) Position yoke (18) in governor housing and install shaft (15). Secure yoke to shaft with roll pin (12).

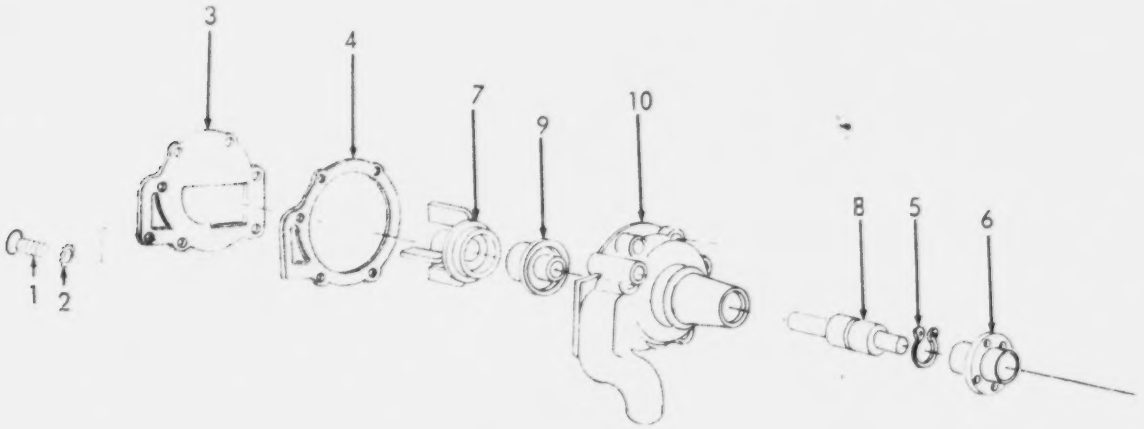
(4) Install washer (11) and screw (10) in governor housing. Use a suitable press and press gear (8) and spider (7) on shaft (9). Secure spider to shaft with roll pin (6). Position weights (5) on the spider and secure with pin (4).

(5) Install plug (22) and pin (19) in governor housing. Install thrust spool (3), retainer and balls, and thrust washer (1) on governor drive shaft.

f. Installation. Refer to TM 5-3895-275-12, paragraph 4-30, to install and adjust the governor.

3-12. Water Pump

a. Description. The water pump assembly is composed of a body and cover plate which houses a pump shaft and impeller. The pump is of the centrifugal packless-type and is belt driven by the crankshaft pulley.



TS 000832

1. Screw
2. Lockwasher
3. Cover
4. Gasket
5. Retaining ring
6. Fan hub
7. Impeller
8. Shaft
9. Seal
10. Body

Figure 3-27. Water pump.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-37, and remove the water pump.

c. Disassembly (Fig. 3-27).

(1) Remove screw (1), lockwasher (2), cover (3), and gasket (4).

(2) Remove retaining ring (5) and support the water pump on an arbor press and push shaft out as one assembly.

(3) Place the shaft in a press and remove fan hub (6) and impeller (7) from shaft (8). Do not attempt to remove bearing or slinger; they are factory installed on the shaft in the proper location.

(4) Use a drift and carefully drive seal (9) from the body (10) through the back side of pump. Discard the seal; always use a new seal on reassembly.

d. Cleaning, Inspection and Repair.

(1) Clean all parts (except seal) with a cleaning solvent.

(2) Inspect shaft and bearing for cracks, breaks, scoring, or excessive wear. Replace a defective shaft and bearing.

(3) Examine the pump impeller seat seal surface. If the surface is scored, it must be resurfaced or replaced to prevent leakage.

(4) Inspect the water pump body seal seat. If scared or pitted, it must be resurfaced.

e. Reassembly.

(1) Press fan hub (6) on shaft (8).

(2) Place pump body (10) in a press, and after aligning seal (9), press seal into body.

(3) Install the shaft in pump body from the front end by pressing shaft, bearing, slinger, and fan hub in as one unit. Install retaining ring (5) behind the fan hub.

(4) Press impeller (7) on rear end of shaft (8). Place a straight-edge across the back of the water pump body and check for *clearance* between the straight-edge and impeller. Position a new gasket (4) on pump body. Install cover (3) and secure with lockwasher (2) and screw (1).

f. Installation. Refer to TM 5-3895-275-12, paragraph 4-37, and install the water pump.

3-13 Alternator (Fig. 3-28)

a. General. The alternator supplies current to keep the batteries in a charged condition by replacing electrical energy used by loads on the batteries. The alternator is sealed against entrance of dirt, and is V-belt driven from the fan-water pump pulley.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-38, and remove the alternator.

c. Disassembly.

(1) Remove nut (1), lockwasher (2), and spacer ring (3). Remove terminal assembly nuts (4 and 5).

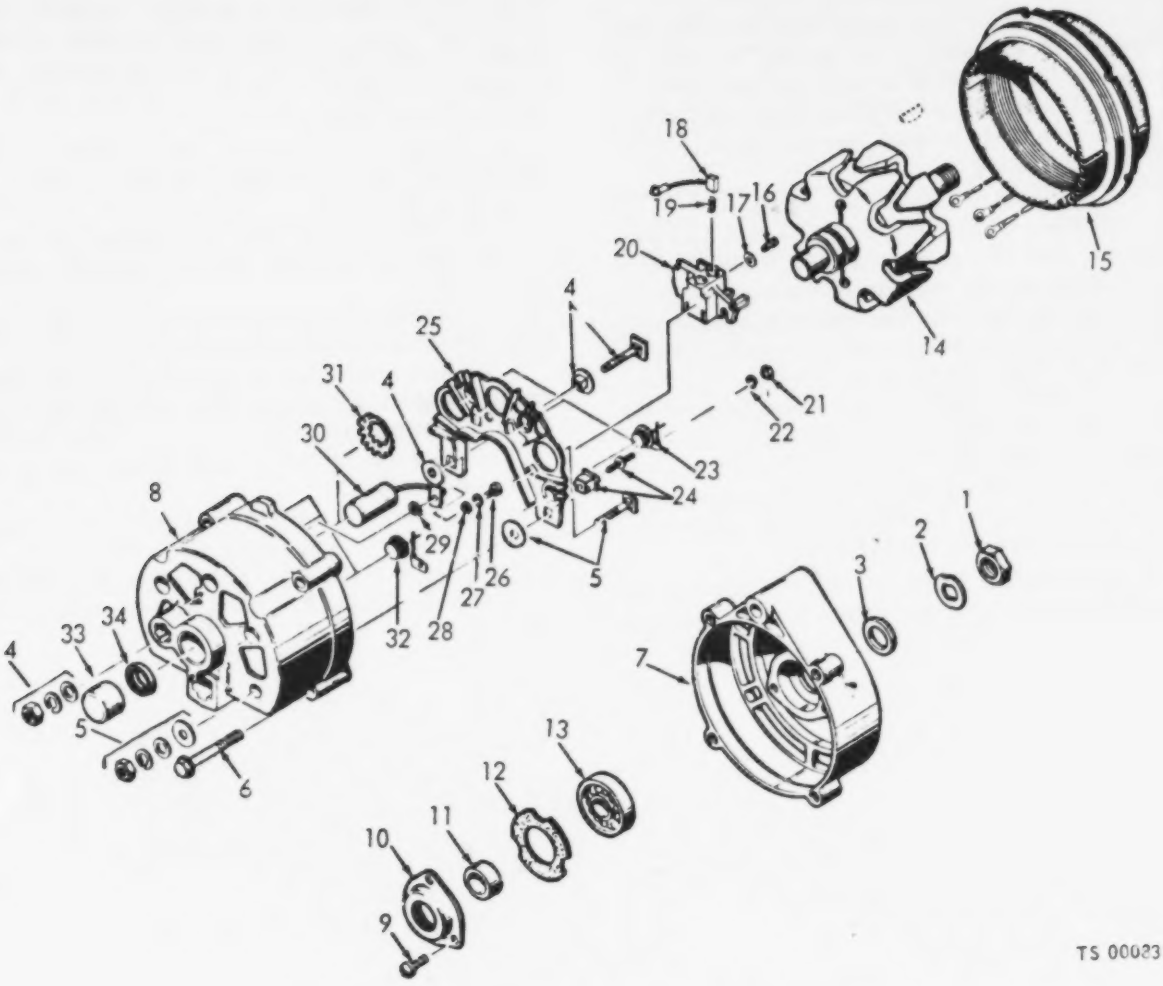
(2) Remove thru-screws (6) and separate the drive frame (7) from the rear frame (8).

(3) Remove screw (9), bearing retainer (10), spacer sleeve (11), gasket (12), and bearing (13) from front end frame.

(4) Remove rotor (14) and stator (15) from rear end frame.

(5) Remove screw (16), washer (17), brush (18), spring (19), and brush holder (20).

(6) Remove nut (21), lockwasher (22), diode (23), and diode terminal (24). Remove heat sink (25).



1. Nut
2. Lockwasher
3. Spacer ring
4. Terminal assembly
5. Terminal assembly
6. Screws
7. Drive frame
8. Rear frame
9. Screw
10. Bearing retainer
11. Spacer sleeve
12. Gasket
13. Bearing
14. Rotor
15. Stator
16. Screw
17. Washer
18. Brush
19. Spring
20. Brush holder
21. Nut
22. Lockwasher
23. Diode
24. Diode terminal
25. Heat sink
26. Screw
27. Lockwasher
28. Flatwasher
29. Insulator washer
30. Capacitor
31. Washer
32. Diode
33. Bearing
34. Retainer

Figure 3-28. Alternator assembly.

(7) Remove screw (26), lockwasher (27) flatwasher (28), insulator washer (29), and capacitor (30).

(8) Remove washer (31), diode (32), bearing (33), and retainer (34).

d. Cleaning. Clean all parts with a dry lint-free

cloth. Use filtered compressed air to blow dust or dirt from end frames.

NOTE

Do not wash alternator parts in cleaning solvent.

e. Inspect and Repair.

(1) *Rotor.* Refer to figure 3-29 and perform the following checks.

CAUTION

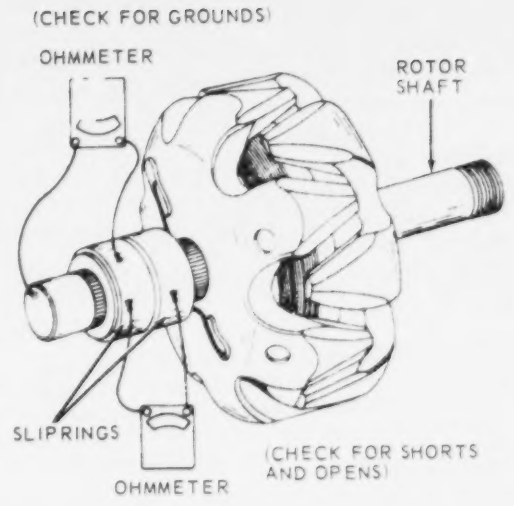
Do not touch test probes to machined surfaces or brush wear surfaces.

(a) *Grounds.* Connect 110-volt test lamp or an ohmmeter from either slipring to the rotor shaft or to the rotor poles. If the lamp lights, or if ohmmeter reading is low, it indicates the field is grounded.

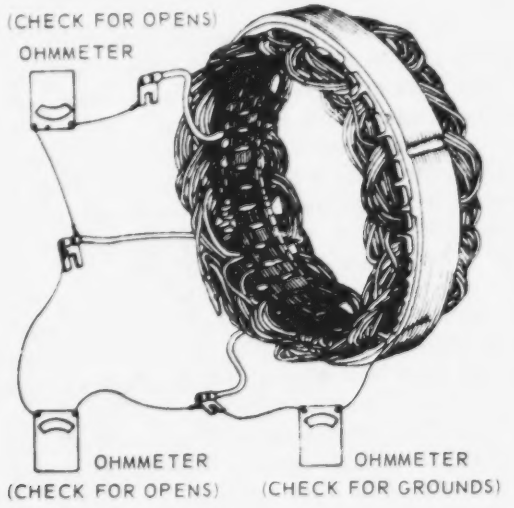
(b) *Open windings.* Connect test lamp or ohmmeter to each slipring and if lamp fails to light or if ohmmeter reading is high (infinite), winding is open.

(c) *Short-circuits.* Connect a battery and ohmmeter in series with two sliprings. Note the ammeter reading. If the reading is above 1.9-to 2.3-ohms, it indicates shorted windings.

(d) *Field resistance.* Connect an ohmmeter to the two sliprings and check the resistance of the field. If the resistance reading is below 1.9 to 2.3 ohms, the winding is shorted. Replace a defective rotor.



A. ROTOR



B. STATOR

TS 000834

Figure 3-29. Checking rotor and stator for shorts, grounds and open circuits.

(2) *Stator.* Refer to figure 3-29 and perform the following checks.

(a) *Ground.* Check stator windings with a 110-volt test lamp or an ohmmeter. If the test lamp lights, or if the ohmmeter reading is low when connected from any stator lead and to the frame, the windings are grounded.

(b) *Open windings.* Connect test lamp or ohmmeter to any stator lead and to the frame. The windings are open if the lamp fails to light or if the meter reading is high when successively connected between each pair of stator leads. Replace stator having grounded or open windings.

NOTE

Due to low resistance of the stator windings, it is difficult to locate a short circuit in the windings without the use of laboratory test equipment. Shorted stator windings are indicated if all other electrical checks are normal but alternator does not supply rated output.

(3) *Diodes.* Refer to figure 3-30 and check each diode electrically for a shorted or open condition by any one of the following methods.

(a) *Ohmmeter method.* Use an ohmmeter with a 1½ volt cell and use the lowest range scale. Disconnect stator from the heat sink diodes.

1. Connect one ohmmeter lead to the heat sink and the other one to the diode lead and note the reading. Reverse the ohmmeter lead connections and check the reading.

2. If both readings are either very low or very high, the diode is defective. A good diode is indicated by one low reading and one high reading. Check the two remaining heat sink diodes in same manner.

3. Check the end frame diodes in the same manner as the heat sink diodes. However, connect one ohmmeter lead to the end frame and one to the diode lead. Check all three diodes in the way previously described.

(b) *Test lamp method.* Test lamp of not more than 12-volts is required. Disconnect stator from the heat sink diodes.

CAUTION

Do not use 110-volt test lamp to check diodes.

Connect the test lamp in the same manner as the ohmmeter. If the lamp lights in both checks, or fails to light in both checks, diode is defective. When diode is not defective, the test lamp will light in only one of two checks. Check all diodes and replace defective ones.

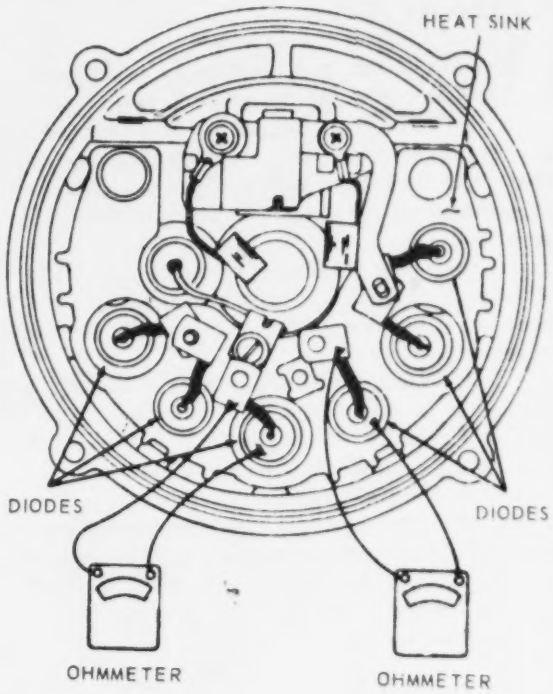


Figure 3-30. Checking heat sink diodes.

(4) *Diode replacement.* When a diode requires replacement, proceed as follows:

CAUTION

Do not hammer diodes into position as the shock will damage them.

(a) Support the end frame or heat sink in a suitable tool and push out the old diode with an arbor press or vise.

(b) Press the diode in with a suitable tool which fits over the outer edge of the diode while supporting the heat sink or end frame.

(5) *Slipring.*

(a) *Clean.* To clean sliprings, use 400-grain or finer polishing cloth. Spin the rotor in a lathe or by other means and hold the polishing cloth against the sliprings until they are clean.

(b) *Repair.* Out-of-round or rough sliprings should be trued to 0.002 inch maximum indicator readings in a lathe. Remove just enough material

to make the rings smooth and round. Polish slipring with 400-grain or finer polishing cloth.

(6) *Bearing (drive bearing).*

(a) The drive bearing can be removed by detaching the retainer plate and then pressing the bearing from the front plate.

(b) Check the bearing; if it is satisfactory, it can be reused. It should be cleaned with cleaning solvent and lubricated ¼ full with MILG-18709 lubricant.

CAUTION

Do not overfill with lubricant as this could cause the bearing to overheat.

(c) Press the bearing in with a suitable tool which fits over the outer race. If the felt seal is worn excessively or hardened, it is recommended that a new retainer plate be installed.

(7) *Bearing (rear frame).*

(a) The slipring rear frame bearing should be replaced if its grease supply is exhausted. Never attempt to relubricate and reuse the bearing.

(b) Press the bearing out from the slipring rear frame with a suitable tool that fits just inside the rear frame housing. Press the bearing out from outside the housing toward the inside.

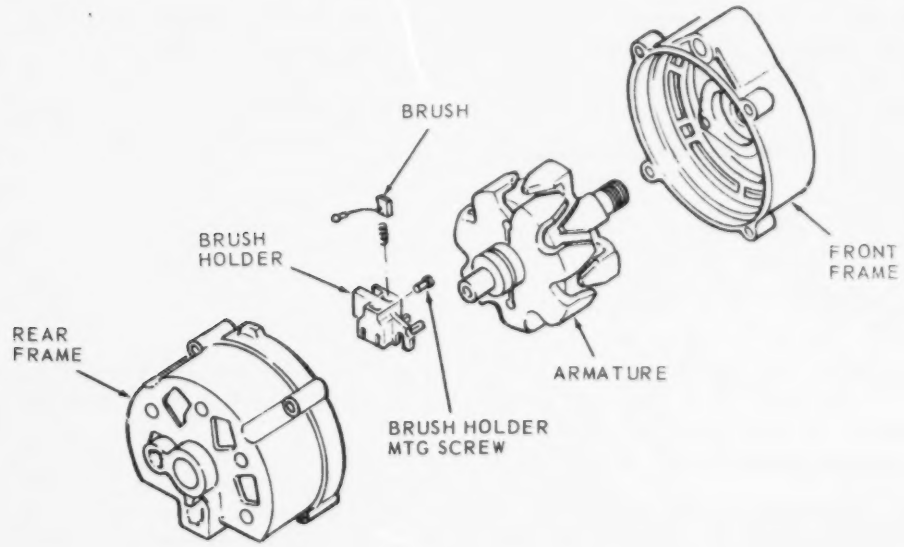
(c) Press in the new bearing with a flat plate. Press bearing in from outside of the rear frame until the bearing is flush with the outside of the rear frame. To prevent breakage of the rear frame, support it on the inside with a hollow cylinder. When installing the new bearing, use extreme care to avoid misalignment or other undue stress on the bearing. Saturate the felt seal in 0E10 oil (MIL-L-2104), then reassemble felt seal and retainer.

(8) *Brush replacement.*

(a) When separating the rear frame from the rotor and front end frame assembly, the brushes will drop down onto the shaft and come into contact with lubricant. If brushes are to be reused, they must be thoroughly cleaned with a soft dry cloth. Also clean the shaft thoroughly before beginning reassembly.

(b) Inspect the brush springs for evidence of corrosion or other damage. Be sure to replace the brush springs if there is any doubt as to their condition.

(c) When new brushes are required, install them as follows: Remove the two brush holder screws, then remove brush holder assembly from the rear frame. After installing the springs and brushes in the brush holder, insert a piece of straight wire or pin into holes at the bottom of the holder to retain brushes. Then install the brush holder assembly into the rear frame, noting carefully the proper alignment of parts (fig. 3-31).



TS 000836

Figure 3-31. Brush holder assembly.

(9) *Heat sink replacement.*

(a) To replace the heat sink, remove the "BAT" and "GRO" terminals from the end frame and the screw attaching the condenser lead to heat sink.

(b) During reassembly, carefully note the alignment of parts as shown on figure 3-28.

f. Reassembly.

(1) Install bearing (33), retainer (34), diode (32), and washer (31) in the rear frame.

(2) Install capacitor (30) and secure with insulator washer (29), flatwasher (28), lockwasher (27), and screw (26).

(3) Install heat sink (25) and secure with terminal assembly (4 and 5). Install diode terminal (24) and diode (23). Secure diode with lockwasher (22) and nut (21).

(4) Install brush holder (20), and secure with washer (17) and screw (16). Install spring (19) and brush (18). Insert a piece of straight wire or pin into holes at bottom of the brush holder to retain brushes.

(5) Install stator (15) and rotor (14) in rear frame (8).

(6) Press bearing (13) in drive frame (7). Install gasket (12), spacer (11) and bearing retainer (10). Secure bearing retainer with screw (9).

(7) Install spacer ring (3), lockwasher (2), and nut (1) on rotor. When the alternator is assembled, withdraw the brush retaining wire through the hole in the end frame, allowing the brushes to make contact with the sliprings.

g. Alternator Test. Refer to TM 5-3895-275-12, paragraph 4-38, and test the alternator.

h. Installation. Refer to TM 5-3895-275-12, paragraph 4-38, and install the alternator.

3-14. Starter (Fig. 3-32)

a. Description. The starter is flange-mounted to the flywheel housing, and the armature revolves in a clockwise direction when viewed from the flywheel end. The starter is equipped with a bendix or overrunning clutch drive. The drive provides engagement of the drive pinion with the flywheel ring gear. As soon as the engine starts the pinion is automatically demeshed by the reversal of torque.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-40, and remove the starter.

c. Disassembly. Disassembly should proceed only so far as is necessary to make repairs or replace defective parts.

(1) Remove terminal stud nut (1) and flatwasher (2). Remove through bolts (3), lockwasher (4), and frame and end assembly (5).

(2) Remove terminal assembly (6), stud (7), insulator (8), washer (9), and washer (10). Remove expansion plug (11), and drive sleeve bearing (12) from frame and end assembly.

(3) Remove screw (13), brush (14), spring (15), and brush holder (16).

(4) Remove screw (17), lockwasher (18), and lead assembly (19).

(5) Remove drive housing (20) and drive sleeve bearing (21) from housing. Remove starter drive assembly (22) from armature shaft (23) by using a press or a puller and remove key (24).

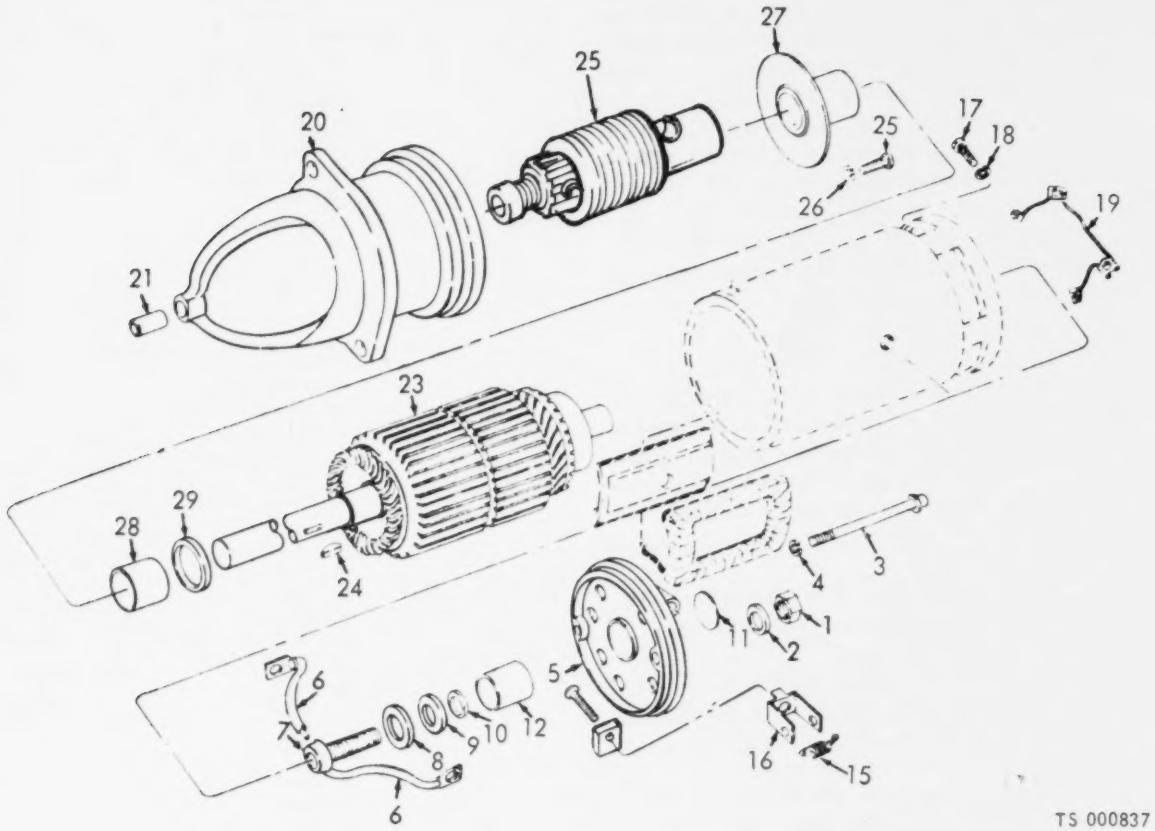
NOTE

Do not attempt disassembly of the starter drive assembly. If defective, the complete assembly must be replaced.

(6) Remove screw (25), lockwasher (26), and center bearing plate (27). Press sleeve bearing (28) from center bearing housing. Remove washer (29) from armature shaft.

NOTE

Do not remove filed coils. If tests indicate coils are defective, replace starting motor.



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1. Nut
2. Flatwasher
3. Bolts
4. Lockwasher
5. Frame and end assembly
6. Terminal assembly
7. Stud
8. Insulator
9. Washer
10. Washer
11. Expansion plug
12. Sleeve bearing
13. Screw
14. Brush
15. Spring
16. Brush holder
17. Screw
18. Lockwasher
19. Lead assembly
20. Drive housing
21. Sleeve bearing
22. Starter drive assembly
23. Armature shaft
24. Key
25. Screw
26. Lockwasher
27. Center bearing plate
28. Sleeve bearing
29. Washer

Figure 3-32. Starter.

d. Cleaning, Inspection and Repair. Clean, inspect and repair as directed in TM 5-764.

e. Reassembly.

(1) Install washer (29) on armature shaft. Press sleeve bearing (28) in center bearing plate (27). Install center bearing on armature shaft.

(2) Install key (24) in armature shaft (23) and press on starter drive assembly (22). Press sleeve bearing (21) in drive housing (20).

(3) Install lead assembly (19) and secure with lockwasher (18) and screw (17).

(4) Install brush holder (16) on frame and end assembly (5). Install spring (15), brush (14), and screw (13).

(5) Press sleeve bearing (12) in frame and end assembly and install expansion plug (11). Install washer (10), washer (9), insulator (8), stud (7),

and terminal assembly on frame and end assembly.

(6) Place drive housing (20) on armature shaft, after placing a few drops of oil on center bearing. Secure center bearing to drive housing with lockwasher (25) and screw (26).

(7) Position frame and end assembly (5) on field frame. Secure frame and end assembly with lockwasher (4) and through bolts (3). Install terminal stud flatwasher (2) and nut (1).

f. Installation. Refer to TM 5-3895-275-12, paragraph 4-40, and install the starter.

3-15. Distributor (Fig. 3-33)

a. Description.

(1) The distributor has three functions: to open and close a low voltage circuit between the source of current and the ignition coil; to time the current surges to the requirements of the engine. This is accomplished by the advance mechanism; and to direct the high voltage surge through the rotor, cap, and high tension wiring to the spark plugs.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-41, and remove the distributor.

c. Disassembly.

(1) Remove screw (1), cover assembly (2), and gasket (3). Remove brush, cap (4), and spring (5). Remove screw (6), flatwasher (7), ignition cap (8), and gasket (9), from cover assembly.

(2) Lift out rotor (10). Remove nut (11), washer (12), screw (13), and lead (14). Remove screw (15), lockwasher (16), clamp (17), and capacitor (18).

(3) Remove contact (19), screw (20), and contact set (21). Remove screw (22), key washer (23), breaker plate (24), capacitor (25), and spring (26).

(4) Remove nut (27), lockwasher (28), screw (29), bracket (30), resistor (31), and insulator (32). Remove nut (33), nut (34), screw (35), plate (36), coil (37), and washer (38).

(5) Remove screw (39), coupling (40), spring (41), gasket (42), capacitor (43), breather (44), and plug (45) from distributor housing (46).

Key for figure 3-33.

1. Screw
2. Cover assembly
3. Gasket
4. Brush, cap
5. Spring
6. Screw
7. Flatwasher
8. Ignition cap
9. Gasket
10. Rotor
11. Nut
12. Washer
13. Screw
14. Lead
15. Screw
16. Lockwasher
17. Clamp
18. Capacitor
19. Contact
20. Screw
21. Contact set
22. Screw
23. Key washer
24. Breaker plate
25. Capacitor
26. Spring
27. Nut
28. Lockwasher
29. Screw
30. Bracket
31. Resistor
32. Insulator
33. Nut
34. Nut
35. Screw
36. Plate
37. Coil
38. Washer
39. Screw
40. Coupling
41. Spring
42. Gasket
43. Capacitor
44. Breather
45. Plug
46. Housing
47. Pin
48. Gear
49. Shim
50. Shim
51. Spring
52. Nut
53. Lockwasher
54. Plate
55. Wick
56. Cam
57. Weight
58. Shaft
59. Sleeve bearing
60. Flatwasher

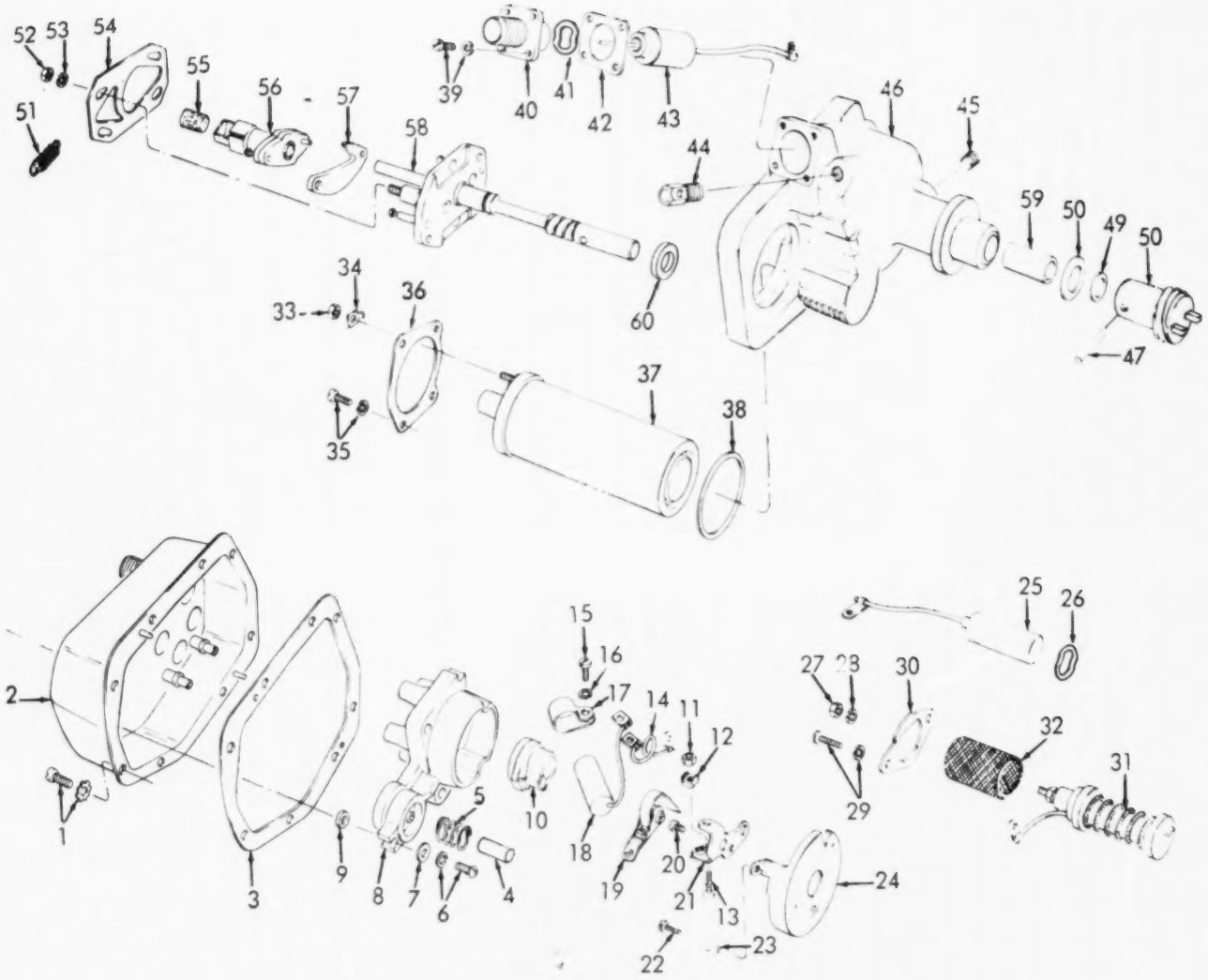

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Figure 3-33. Distributor, disassembly and reassembly.

(6) Remove pin (47), gear (48), and shims (49 and 50) from the distributor drive shaft. Remove weight spring (51), nut (52), lockwasher (53), plate (54), wick (55), cam (56), and weight (57).

(7) Use a suitable press and remove shaft (58) and sleeve bearing (59), from the distributor housing. Remove flatwasher (60) from distributor housing.

d. Cleaning, Inspection, and Repair.

(1) Clean all parts with a cleaning solvent.

CAUTION

Do not clean cap, rotor, condenser, or insulators in any degreasing compound, since this may damage the parts.

(2) Inspect weights, springs, and plate for signs of wear. Replace worn or damaged parts.

(3) Replace contact set that is worn or pitted, or if the breaker lever rubbing block is excessively worn.

(4) Inspect ignition cap and rotor for chips or cracks. Replace defective parts.

(5) Inspect the housing bushing. If out-of-round or scored, replace.

e. Reassembly.

(1) Install flatwasher (60) in distributor housing. Use a suitable press and install sleeve bearing (59) and shaft (58) in distributor housing.

(2) Install weight (57), cam (56), wick (55), plate (54), lockwasher (53), nut (52), and spring (51), on shaft. Install shims (50 and 49) and gear (48). Secure gear to shaft with pin (47).

(3) Install plug (45), and breather (44) in distributor housing (46). Install capacitor (43), gasket (42), spring (41), and coupling (40). Secure coupling with screw (39).

(4) Install washer (38), coil (37), and plate (36). Secure plate with screw (35). Install nuts (34) and (33). Install insulator (32), resistor (31), and bracket (30). Secure bracket with screw (29). Install lockwasher (28) and nut (27) on resistor.

(5) Install spring (26), capacitor (25), and breaker plate (24). Secure breaker plate with key washer (23) and screw (22). Install contact set (21) and secure with screw (20). Install contact (19)

NOTE

Place lubricant on the cam block. Oil the wick under the rotor and the breaker post.

(6) Install capacitor (18) and secure with clamp (17), lockwasher (16), and screw (15). Install lead (14) and secure with washer (12) and nut (11). Install rotor (10).

(7) Install gasket (9) and ignition cap (8) in cover assembly (2). Secure ignition cap with flatwasher (7) and screw (6). Install spring (5) and brush, cap (4) in cover assembly. Position gasket (3) on distributor housing and install cover assembly (2). Secure cover assembly with screw (1).

f. Installation. Refer to TM 5-3895-275-12, paragraph 4-41, and install the distributor.

Section II. MAINTENANCE OF COOLING SYSTEM

3-16. General

The gasoline engine is cooled by circulation of the engine coolant through the radiator, cylinder block, and cylinder head. Coolant is drawn from the bottom of the radiator by the water pump and circulated through the cylinder block and cylinder head. When the engine is cold, a thermostat (by-pass type) prevents the circulation of the coolant to the radiator and allows the coolant to circulate through the cylinder block and cylinder head. When the coolant uses above 160 F to 170 F, the thermostat opens, allowing the coolant to circulate through the cylinder block, cylinder head, and radiator.

3-17. Radiator

a. Description. The tube and fin type radiator is located at the front of the engine and provides the reservoir and cooling core for the cooling system.

b. Removal. Refer to TM 5-3895-275-12, paragraph 4-35, and remove the radiator.

c. Testing.

(1) Plug all openings in the radiator core except overflow pipe.

(2) Attach an air hose to the overflow pipe and submerge the entire radiator in water. Apply 10-to 20-pounds air pressure and watch for bubbles. The bubbles will indicate location of leaks and assist in determining size of hole. Mark location of leaks, remove air pressure, and dry surface of radiator.

d. Repair. Prepare surface of radiator to receive silver solder. Solder leaks, then repeat test procedure outlined in *c* above.

e. Installation. Refer to TM 5-3895-275-12, paragraph 4-35, and install the radiator.

Section III. WIRING HARNESS

3-18. General

The wiring harness includes all wiring to lights, switches, gages, and controls. Refer to TM 5-3895-275-12, figs. 1-3 and 1-4, for wiring diagram.

3-19. Wiring Harness

a. Removal. Removal of wiring from the wiring harness is confined to only that wiring which is defective and not the removal of the harness assembly. In most instances, it is better to disconnect the defective wire at each end, and connect a new wire outside the harness.

b. Testing. Using a test light or ohmmeter, connect one probe to each end of wire suspected of being defective and test for continuity. If no continuity exists, replace the wire.

c. Installation. Refer to TM 5-3895-275-12, figures 1-3 and 1-4, and replace defective wiring as required.

Section IV. TRANSMISSIONS

3-20. General

The main transmission is a 4-speed automotive type incorporating a reverse gear and mounts directly on the 2-speed secondary transmission. Both are totally enclosed, ball bearing type operating in oil and transmit the power from the engine to the feeders, screw conveyors, and crawlers by chain drive. Both the main and secondary transmissions may be removed as a unit.

3-21. Secondary Transmission

a. Removal. Refer to paragraph 2-10, and remove the transmissions.

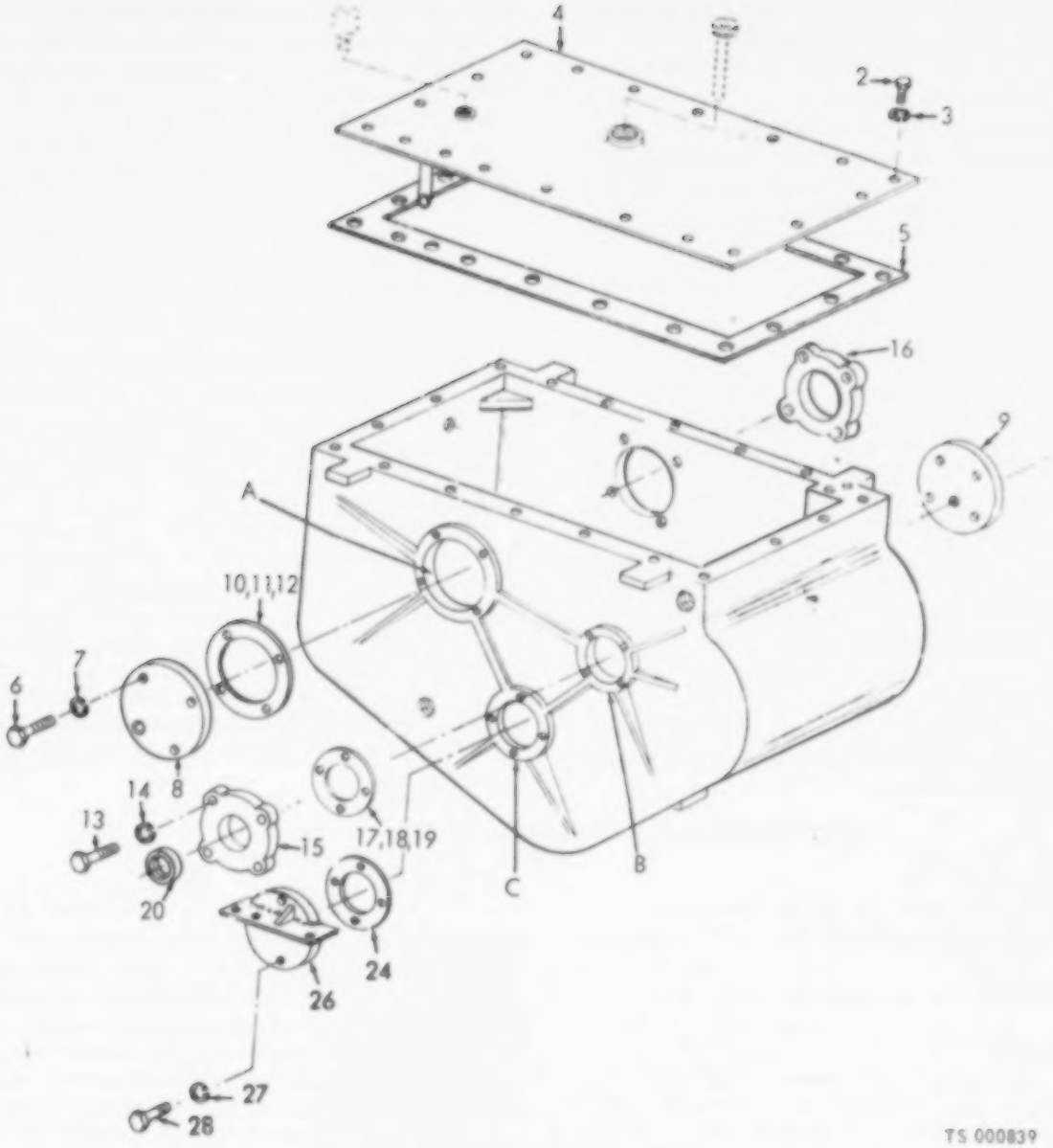
b. Disassembly (Secondary Transmission).

(1) Remove drain plug (1, fig. 3-34) and drain lubricant from housing.

(2) Remove screw (2), lockwasher (3), cover (4), gasket (5). Remove screw (6), lockwasher (7), end caps (8 and 9), and shims (10, 11 and 12). Remove screws (13), lockwashers (14), bearing retainers (15 and 16), and shims (17, 18 and 19). Remove seal (20) from bearing retainer.

(3) Clamp helical gear (1, fig. 3-35) to side of housing. Remove retaining ring (2) and drive splined shaft (3) out from opposite side of housing.

(4) Remove helical gear (4), shims (5 and 6), spacer (7), shim (8), bearing (9), spacers (10 and 11), and gear (12) from housing. Remove cone and rollers (13) and cup (14). Remove screw (15) and separate bevel gear set (16) and helical gear (1).



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1. Plug
2. Screw
3. Lockwasher
4. Cover
5. Gasket
6. Screw
7. Lockwasher
8. End cap
9. End cap
10. Shim
11. Shim
12. Shim
13. Screw
14. Lockwasher
15. Bearing retainer
16. Bearing retainer
17. Shim
18. Shim
19. Shim
20. Seal

Figure 3-34. Secondary transmission housing, covers, and bearing retainers.

(5) Remove expansion plug (17) and setscrew (18). Remove setscrew (19), spring (20), and ball (21). Drive shifter shaft (22) out of transmission housing and remove shifter forks (23). Remove oil seal (24) from housing.

(6) Clamp helical gear (25) to side of housing and drive splined shaft (26) through gear, toward shifter gear clutch (27) just enough to allow retaining ring (28) to be removed.

CAUTION

Make sure spacer (29) is up on top of splines and is free to allow shaft to slide out.

(7) Clamp helical gear (30) to side of housing and drive splined shaft (26) out (opposite direction used in step 6) of housing.

(8) Remove spacer (31), shim (32), bearing race (33), and bearing (34) from housing. Remove shim (35), spacer (36), cone and rollers (37), cup (38), and shim (39) from housing.

(9) Remove spring (40) and ball (41). Remove setscrew (42) and drive shifter shaft (43) out of transmission housing. Remove shifter fork (44).

(10) Drive shaft assembly (C, fig. 3-33) from housing. Remove bearing cups (45), cone and rollers (46), and shaft (47). Remove gear (48), spacer (49), bearing (50), and bearing race (51). Remove shim (52), helical gear (53), shim (54), and spacer (55), from housing.

(11) Remove cotter pin (56) and nut (57), and remove pinion gear (58), (part of bevel gear set) from main transmission shaft. Remove shim (59).

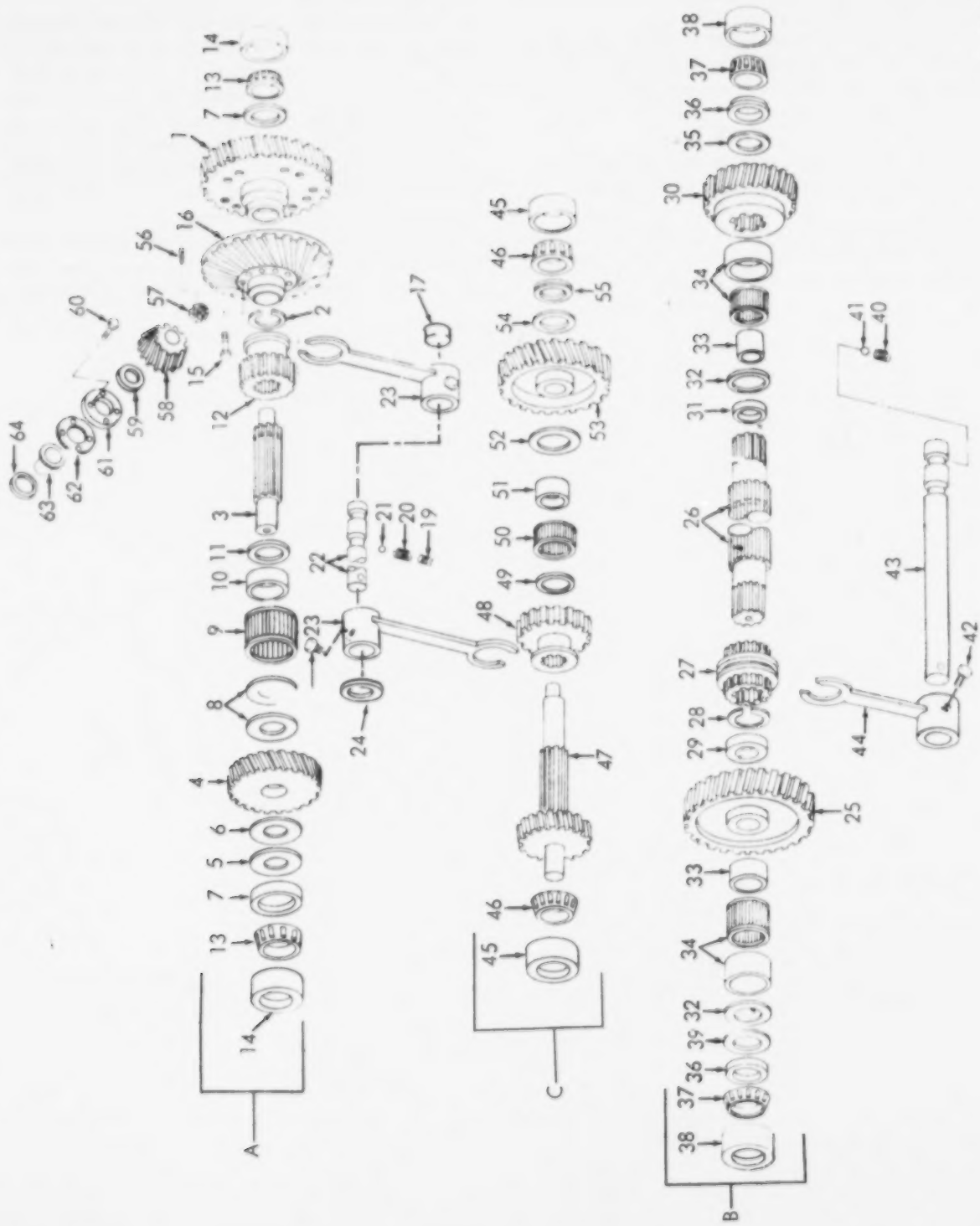

Figure 3-35. Secondary transmission assembly.

KEY for figure 3-35.

1. Gear
2. Retaining ring
3. Shaft
4. Gear
5. Shim
6. Shim
7. Spacer
8. Shim
9. Bearing
10. Spacer
11. Spacer
12. Gear
13. Cone and rollers
14. Cups
15. Screw
16. Bevel gear set
17. Expansion plug
18. Setscrew
19. Setscrew
20. Spring
21. Ball
22. Shifter shaft
23. Shifter forks
24. Oil seal
25. Gear
26. Shaft
27. Gear clutch
28. Retaining ring
29. Spacer
30. Gear
31. Spacer
32. Bearing race
33. Bearing race
34. Bearing
35. Shim
36. Spacer
37. Cone and rollers
38. Cup
39. Shim
40. Spring
41. Ball
42. Setscrew
43. Shaft
44. Shifter fork
45. Cup
46. Cone and rollers
47. Shaft
48. Gear
49. Spacer
50. Bearing
51. Bearing race
52. Shim
53. Gear
54. Shim
55. Spacer
56. Cotter pin
57. Nut
58. Pinion gear
59. Shim
60. Screw
61. Seal retainer
62. Gasket
63. Spacer
64. Seal

(12) Remove screw (60), seal retainer (61), gasket (62), spacer (63), and seal (64). Remove five remaining screws and locks and separate the main transmission from secondary transmission.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect transmission case for cracks, breaks, or other damage. Repair or replace damaged case.

(3) Inspect all gears for cracks, breaks, and chipped, worn or damaged teeth. Replace a damaged or defective gear.

(4) Inspect the bearings, check races for cracks, breaks, excessive wear or other damage. Replace a worn, damaged, or defective bearing.

(5) Inspect all shafts for cracks, breaks, scoring, burs, or signs of wear. Replace a worn, defective, or damaged shaft.

(6) Inspect shifter rods, shifter forks, springs, and interlock balls, for cracks, distortion, excessive wear, weak spring tension and other damage. Replace damaged or defective parts.

d. Reassembly.

(1) Position new gasket between secondary and main transmission housing. Install five screws and locks that secure secondary transmission case to main transmission.

(2) Install seal (64, fig. 3-35), spacer (63), gasket (62), and seal retainer (61). Secure seal retainer with screws (60).

(3) Install gear (48), spacer (49), bearing (50), bearing race (51), shim (52), helical gear (53), shim (54), spacer (55), and cone and rollers (46) on shaft (47). Install assembled shaft in transmission housing. Install bearing cups (45).

(4) Place helical gear (25) in position in housing by using clamps. This must be done before installing bevel gear shaft assembly (A) as it interferes with putting gear in later.

(5) Install shims (59) and pinion gear (58) and secure with nut (57) and cotter pin (56). Install bevel gear set (16) on helical gear (1) and secure with screw (15). Install assembled gears in housing and hold in position with clamps.

(6) Position gear (4) in housing and install shaft (3) thru gear. Assemble shim (8), bearing (9), spacers (10 and 11), gear (12), and retaining ring (2) on shaft. Drive assembled shaft thru bevel gear set (16) and helical gear (1). Install shims (6 and 5), spacer (7), cone and rollers (13), and cup (14).

NOTE

The bevel ring gear (16) and bevel pinion (58) are a matched set. The amount of backlash required is etched on the back side of the teeth on the gears. These gears also have mesh setting marks etched on them and must be matched when installing. The bevel gear shaft must have *no appreciable* end play. Bearing adjustments are obtained through shims (10, 11, 12, fig. 3-34).

(7) Install shaft (26, fig. 3-35) thru gear (25). Assemble spacer (29), retaining ring (28), gear clutch (27), spacer (31), shim (32), bearing race (33), and bearing (34) on shaft. Drive assembled shaft thru helical gear (30). Install shims (32, 35 and 39) spacer (36), cone and rollers (37), and cup (38) on shaft.

(8) Bearing adjustments are obtained through shims (17, 18, and 19, fig. 3-34). Adjust bearings for 0.003-0.005 inch shaft end play.

(9) Position shifter fork (44, fig. 3-35) in housing. Drive shifter shaft (43) in housing and through shifter fork. Secure shifter fork to shaft with setscrew (42). Install spring (40) and ball (41).

(10) Position shifter forks (23) in housing. Drive shifter shaft (22) in housing and through shifter forks. Secure shifter forks to shaft with setscrew (18). Install ball (21), spring (20) and setscrew (19). Install oil seal (24) and expansion plug (17) in housing.

(11) Install shims (17, 18 and 19, fig. 3-34), bearing retainers (16 and 15) and secure with lockwashers (14) and screws (13).

(12) Install shims (10, 11 and 12), end caps (8 and 9), and secure with lockwashers (7), and screws (6). Position gasket (5), on housing and install cover (4). Secure cover with lockwashers (3) and screw (2). Install drain plug (1).

3-22. Main Transmission

a. Removal. Refer to paragraph 3-21 *b*, steps 1, 2, 3, 11 and 12, of disassembly of secondary transmission and separate the two transmissions.

b. Disassembly.

(1) Remove bolt (1, fig. 3-36), lockwasher (2), housing (3), and gasket (4) from reversing transmission housing.

(2) Remove breather (5) and lubrication fitting (6). Remove pin (7), and drive shifter shaft (8), from housing. Remove shifter fork (9), spring (10), and ball (11).

(3) Remove pin (12), setscrew (13), and drive shifter shaft (14) from housing. Remove shift lever (15) and key (16) from housing.

KEY for figure 3-36.

1. Bolt
2. Lockwasher
3. Housing
4. Gasket
5. Breather
6. Lubrication fitting
7. Pin
8. Shifter shaft
9. Shifter fork
10. Spring
11. Ball
12. Pin
13. Setscrew
14. Shifter shaft
15. Shift lever
16. Key

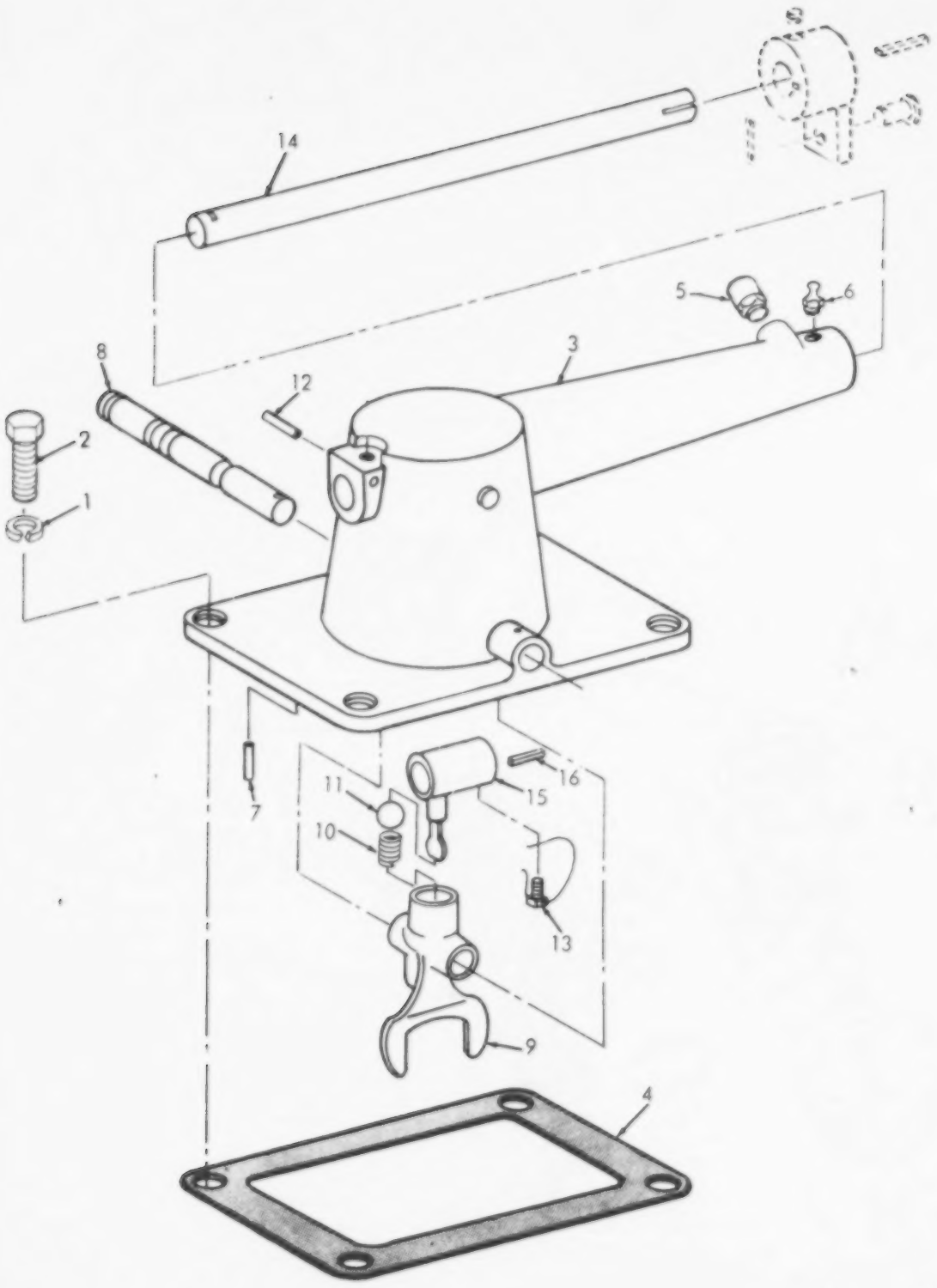

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Figure 3-36. Forward-reverse transmission cover.

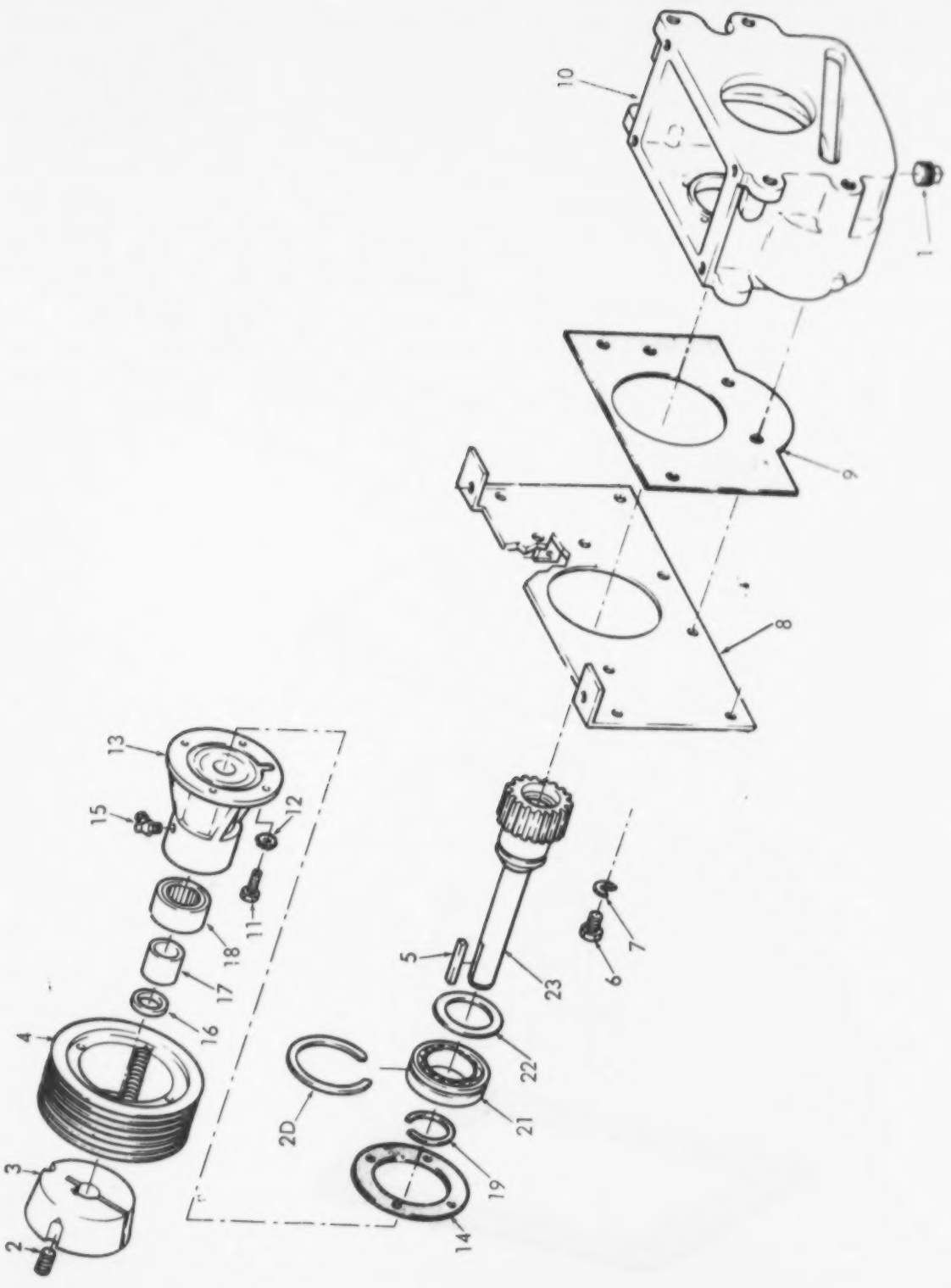
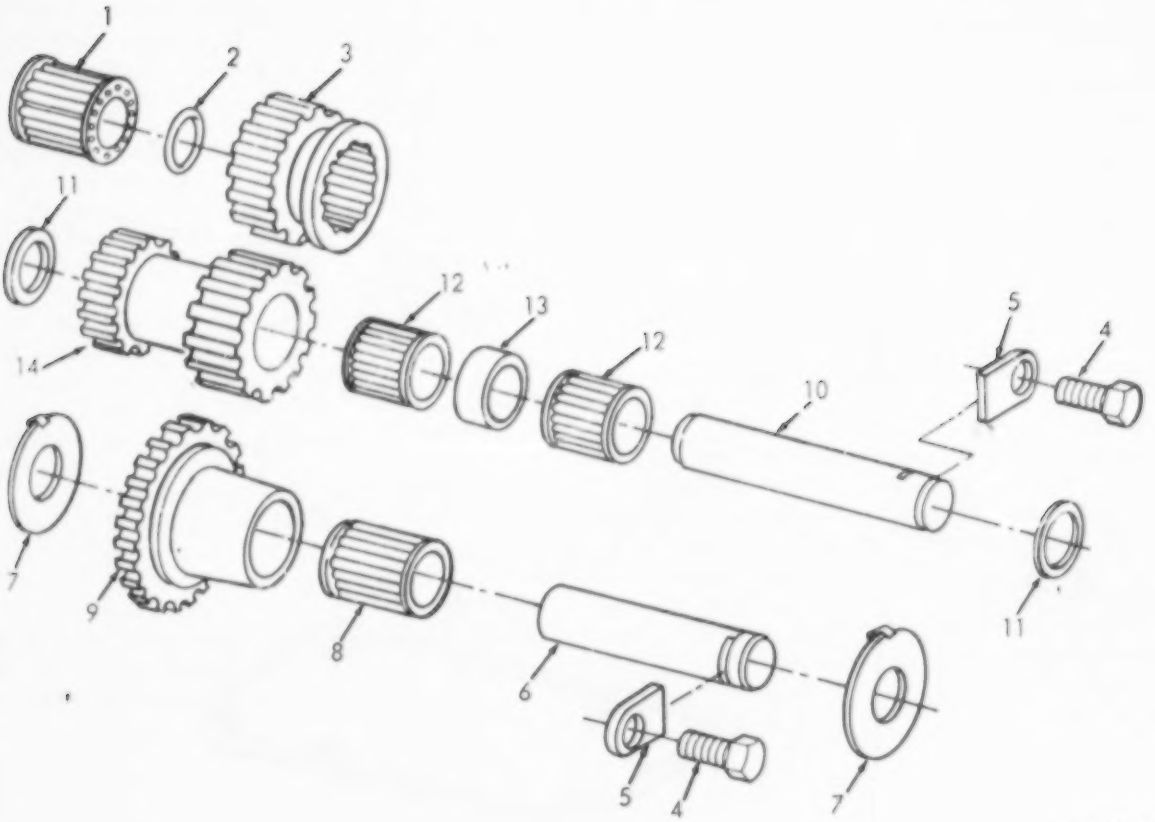


Figure 3-37. Transmission drive and forward power housing

KEY for figure 3-37.

1. Setscrew
2. Bushing
3. Sheave
4. Key
5. Screw
6. Lockwasher
7. Plate
8. Gasket
9. Housing
10. Screw
11. Lockwasher
12. Retainer
13. Gasket
14. Lubrication fitting
15. Spacer
16. Bearing ring
17. Bearing
18. Retaining ring
19. Retaining ring
20. Bearing
21. Washer
22. Shaft



TS 000843

1. Roller assembly
2. Ring
3. Gear
4. Bolt
5. Lock
6. Countershaft
7. Washer
8. Bearing
9. Gear
10. Shaft
11. Washer
12. Bearing
13. Washer
14. Gear

Figure 3-38. Reversing transmission.

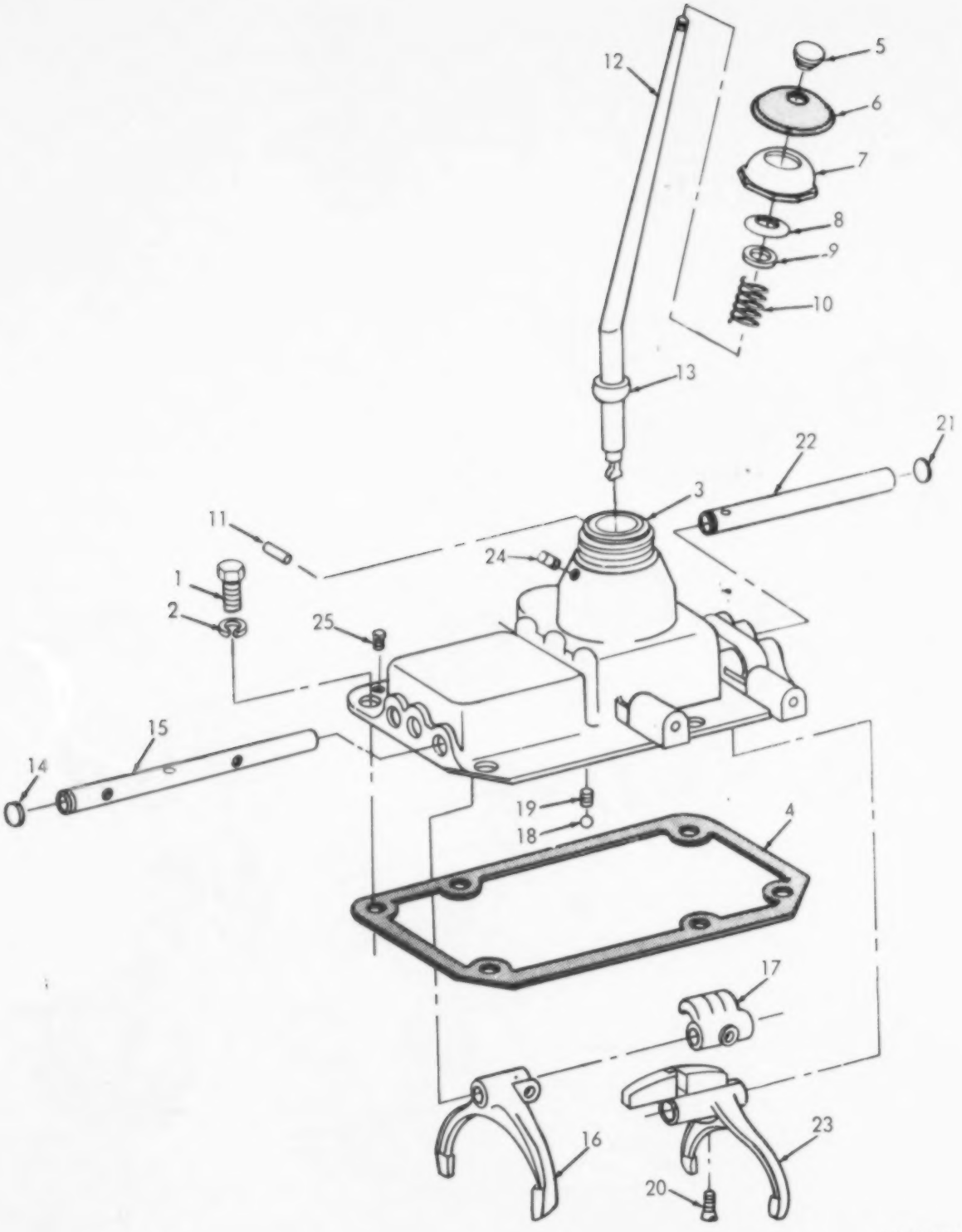


Figure 3-39. Main transmission cover.

KEY for figure 3-39.

1. Bolt
2. Lockwasher
3. Cover
4. Gasket
5. Ball
6. Boot
7. Cap
8. Washer
9. Washer
10. Spring
11. Pin
12. Lever
13. Ball
14. Expansion plug
15. Rail
16. Fork
17. End rail shift
18. Ball
19. Spring
20. Lock screw
21. Expansion shaft
22. Shaft
23. Fork
24. Breather
25. Plug

(4) Remove setscrew (1, fig. 3-37), bushing (2), sheave (3) and key (4).

(5) Remove screw (5), lockwasher (6), plate (7), and gasket (8) from housing (9).

(6) Remove screw (10), lockwasher (11), bearing retainer (12), and gasket (13). Remove lubrication fitting (14), spacer (15), bearing ring (16), and bearing (17) from bearing retainer.

(7) Remove retaining ring (18), retaining ring (19), bearing (20), washer (21) and shaft (22).

(8) Remove roller assembly (1, fig. 3-38) ring (2), and gear (3).

(9) Remove bolt (4), lock (5), and drive countershaft (6) from housing. Remove washer (7), bearing (8), and gear (9).

(10) Drive shaft (10), from housing and remove washer (11), bearing (12), washer (13), and gear (14).

(11) Remove bolt (1, fig. 3-39), lockwasher (2), cover (3), and gasket (4).

(12) Remove bolt (5), boot (6), cap (7), washer (8), washer (9), and spring (10).

(13) Remove pin (11), lever (12), and ball (13). Remove expansion plug (14), and drive rail (15) from cover. Remove fork (16), end rail shift (17), ball (18), and spring (19) from cover.

(14) Remove lock screw (20), expansion plug (21), and drive shaft (22), from cover and remove fork (23). Remove breather (24) and plug (25) from cover.

(15) Remove snap ring (1, fig. 3-40), snap ring (2), and using a suitable puller, remove bearing (3). Remove bearing spacer (4) and main drive gear (5). Remove roller bearings (6) and bearing spacer (7).

(16) Remove cotter pin (8), nut (9), shim (10), spacer (11), washer (12), and ring (13). Remove bearing (14), and retaining ring (15).

(17) Remove capscrew (16), seal retainer (17), shims (18, 19 and 20). Remove bearings (21 and 22). Remove bearing cups (23 and 24) from seal retainer. Remove shims (25, 26, and 27), and spacer (28).

(18) Slide main shaft assembly back toward input end to clear housing and remove shaft assembly.

(19) Remove spring (29), ring (30), ring (31), and plate (32). Remove clutch hubs (33 and 34), ring (35), gear assembly (36), retaining ring (37), and washer (38).

(20) Remove gear (39), roller bearings (40), spacer (41), and retaining ring (42). Remove ring (43), ball (44), spring (45), and plate (46). Remove ring (47), clutch hub (48), and gear (49), from shaft (50).

(21) Remove bolt (1, fig. 3-41), lockwasher (2), plate (3) and remove shaft (4) from housing.

(22) Remove countershaft (5), roller bearing (6), washers (7 and 8) and spacer (9). Remove spacer (10), roller bearing (11) and spacer (12). Remove gear (13) and washer (14).

(23) Remove bolt (15), lockwasher (16), cover (17), and gasket (18). Remove pin (19), packing (20), and pivot arm (21) from transmission housing (22).

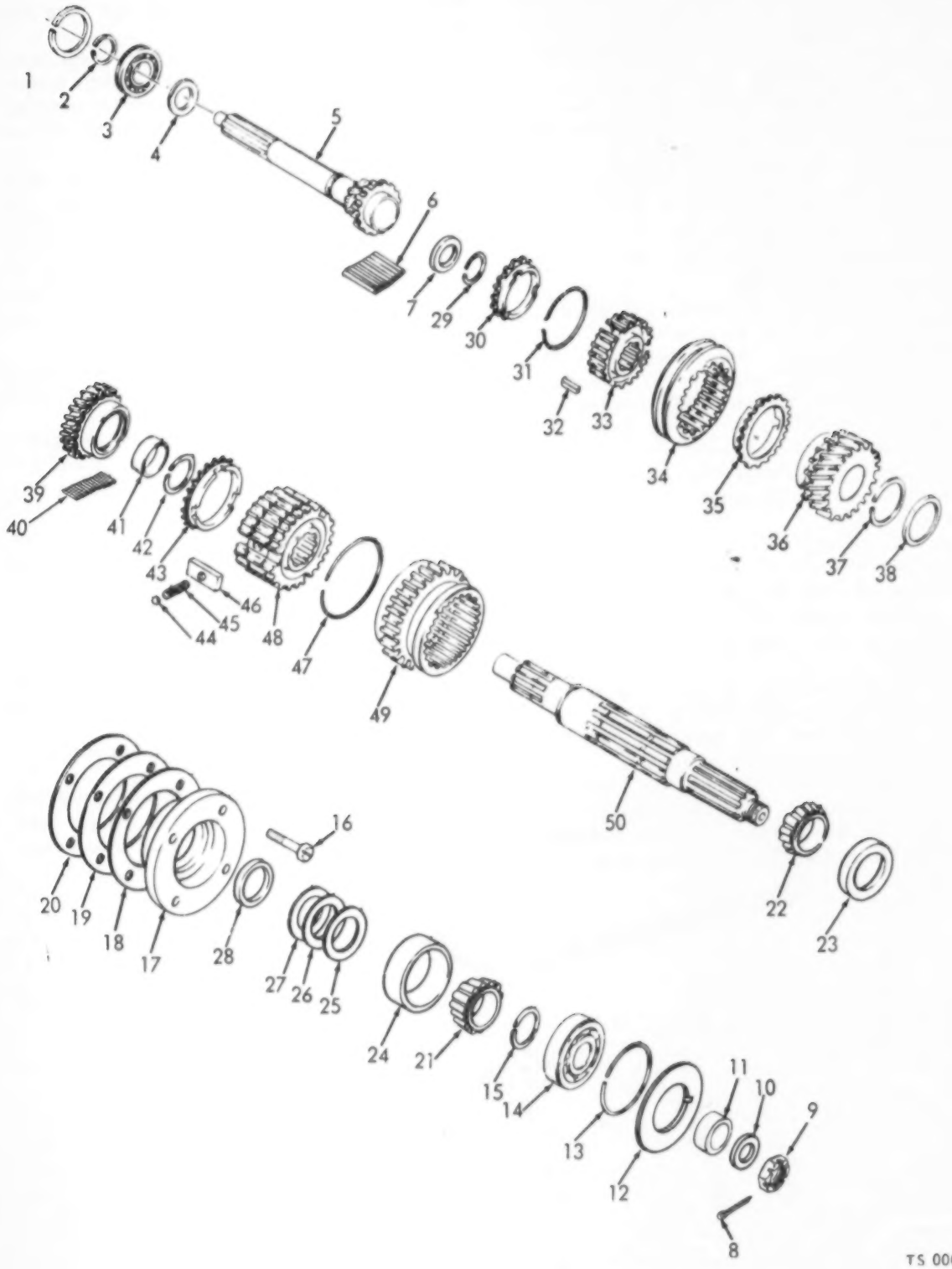
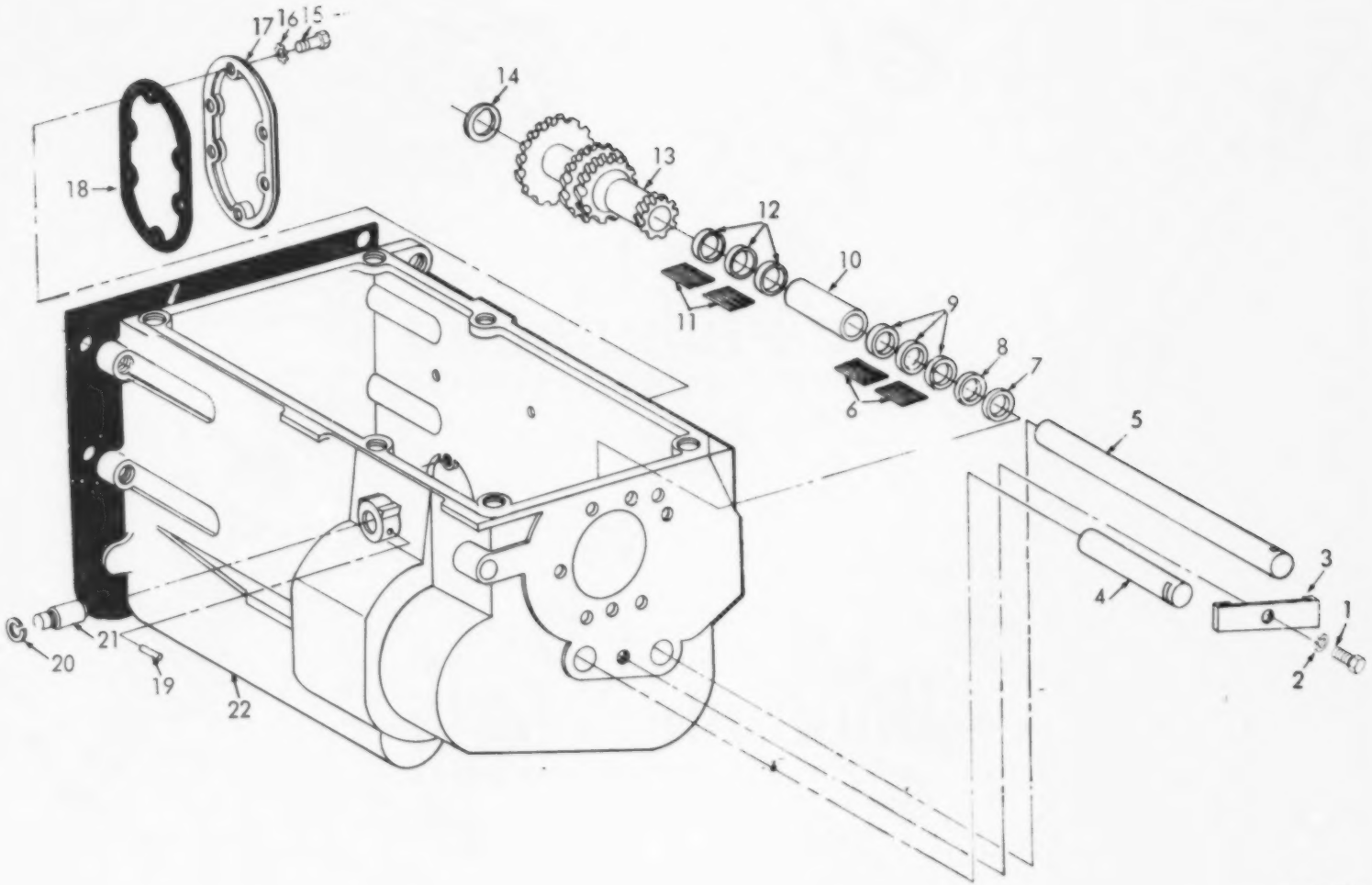


Figure 3-40. Main transmission upper shaft

KEY for figure 3-40.

1. Snapring
2. Snapring
3. Bearing
4. Bearing spacer
5. Drive gear
6. Roller bearings
7. Bearing spacer
8. Cotter pin
9. Nut
10. Shim
11. Spacer
12. Washer
13. Ring
14. Bearing
15. Retaining ring
16. Capscrew
17. Seal retainer
18. Shim
19. Shim
20. Shim
21. Bearing
22. Bearing
23. Bearing cup
24. Bearing cup
25. Shim
26. Shim
27. Shim
28. Spacer
29. Spring
30. Ring
31. Ring
32. Plate
33. Clutch hub
34. Clutch hub
35. Ring
36. Gear assembly
37. Retaining ring
38. Washer
39. Gear
40. Roller bearings
41. Spacer
42. Retaining ring
43. Ring
44. Ball
45. Spring
46. Plate
47. Ring
48. Clutch hub
49. Gear
50. Shaft



1. Bolt
2. Lockwasher
3. Plate
4. Shaft
5. Countershaft
6. Roller bearing
7. Washer
8. Washer
9. Spacer
10. Spacer
11. Roller bearing
12. Spacer
13. Gear
14. Washer
15. Bolt
16. Lockwasher
17. Cover
18. Gasket
19. Pin
20. Packing
21. Pivot arm
22. Housing

Figure 3-41. Main transmission housing and bottom shaft.

c. Cleaning, Inspection and Repair.

(1) Clean all parts in cleaning solvent and dry thoroughly.

(2) Inspect transmission case for cracks, breaks, or other damage. Repair or replace a damaged or defective case.

(3) Inspect all gears for cracks, breaks, and chipped, worn, or damaged teeth. Replace a damaged or defective gear.

(4) Inspect bearings and races for cracks, breaks, and excessive wear. Replace a defective or damaged bearing.

(5) Inspect all shafts for cracks, breaks, scoring, burs, or signs of wear. Replace a worn or damaged shaft.

(6) Inspect shifter rods, shifter forks, springs, and interlock balls, for cracks, breaks, distortion, weak spring tension or other damage. Replace damaged parts.

(7) Replace all gaskets and seals.

d. Reassembly.

(1) Install pivot arm (21, fig. 3-4) in housing (22). Install packing (20), and secure pivot arm with pin (19). Position gasket (18) and cover (17) on housing and secure with lockwasher (16) and bolt (15).

(2) Use a pilot shaft the same diameter as countershaft (5), but shorter and install spacer (12), roller bearing (11), spacer (10), spacer (9), washers (7 and 8), and roller bearings (6) in gear (13). Position assembled gear in housing, install washer (14). Drive countershaft (5) through housing and gear, at the same time driving pilot shaft out of the gear.

(3) Install shaft (4) in housing and secure shafts with plate (3), lockwasher (2), and bolt (1).

(4) Install gear (49, fig. 3-40) clutch hub (48), and ring (47) on shaft (50). Install plate (46), spring (45), and ball (44), on clutch hub (48). Slide clutch hub into gear (49) to hold ball and spring in place. Install ring (43), retaining ring (42), spacer (41), roller bearings (40), and gear (39) on shaft.

(5) Install washer (38), retaining ring (37), gear assembly (36), ring (35), and clutch hubs (34 and 33) on shaft. Install plate (32) and ring (31) on clutch hub. Install ring (30) and spring (29) on shaft.

(6) Press bearing (22) onto shaft (50). Press bearing cups (23 and 24) into seal retainer (17). Install assembled shaft in housing.

(7) Install bearing spacer (7) on shaft. Use a heavy grease to hold roller bearings in place and install roller bearings (6) in main drive shaft (5). Position main drive shaft in housing and install bearing spacer (4), bearing (3), and snap rings (2 and 1).

(8) Position main transmission housing in place against secondary transmission and secure with capscrews. Install shims (18, 19, and 20) on seal retainer. Install spacer (28) and shims (27, 26 and 25). Install seal retainer (17) and secure with capscrew (16).

(9) Install bearing (21), retaining ring (15), bearing (14), ring (13), washer (12), and spacer (11). Install shim (10), nut (9), and cotter pin (8) on shaft (50).

(10) Install plug (25, fig. 3-39) and breather (24) in cover (3). Position fork (23) in cover and install shaft (22) and expansion plug (21). Secure fork to shaft with lock screw (20).

(11) Install spring (19) and ball (18) in cover. Position end rail shift (17) and fork (16) in cover and install rail (15) and expansion plug (14). Position ball (13) on lever (12). Install lever (12) in cover and secure with pin (11).

(12) Install spring (10), washer (9), washer (8), cap (7), boot (6), and ball (5).

(13) Install a new gasket (4) on transmission housing and install cover (3). Secure cover with lockwasher (2) and bolt (1).

(14) Install gear (14, fig. 3-38) washer (13), bearings (12), washer (11), and shaft (10) in housing.

(15) Install gear (9), bearing (8), washer (7), and countershaft (6) in housing. Secure shaft (10) and countershaft (6) with lock (5) and bolt (4).

(16) Install roller assembly (1), rinh (2), and gear (3) in housing. Position housing against main transmission housing and secure with capscrews and lockwashers.

(17) Install shaft (22, fig. 3-37) in housing (9). Install washer (21) on shaft and press bearing (20) in housing. Install retaining rings (19 and 18).

(18) Position gasket (8) on housing (9) and install plate (7). Secure plate to housing with lockwasher (6) and screw (5).

(19) Install bearing (17), bearing ring (16), and spacer (15) in retainer (12). Position gasket (13) on plate and install retainer (12). Secure retainer with lockwasher (11) and screw (10). Install lubrication fitting (14).

(20) Install key (4), sheave (3), and bushing (2) on shaft (22). Secure bushing with setscrew (1).

(21) Install key (16, fig. 3-36) in keyway of shift lever (15). Position shift lever in housing (3) and install shifter shaft (14). Secure shift lever to shifter shaft with setscrew (13). Install pin (12) in housing (3).

(22) Install spring (10), ball (11), in shifter

fork (9). Position shifter fork (9) in housing and install shifter shaft (8). Install pin (7) in housing. Install lubrication fitting (6) and breather (5).

(23) Position gasket (4) on transmission housing and install assembled housing (3). Secure housing with lockwasher (2) and bolt (1).

e. Installation. Refer to paragraph 2-10 and install the transmission.

Section V. MAINTENANCE OF CRAWLER ASSEMBLY AND CRAWLER DRIVE GEAR BOX ASSEMBLY

3-23. Crawler Assembly

a. General. The crawlers are mounted on each side of the machine, being pinned to the oscillating axle at one end and pivoted about the drive shaft brackets on the sides of the tractor unit frame at the other end.

b. Removal.

(1) Run crawler up on 4 x 6 wood members to raise entire machine four inches.

(2) With hydraulic jacks raise the tractor unit at corner where crawler frame is pinned to oscillating axle and under main frame at other end of crawler. Place blocks at these points.

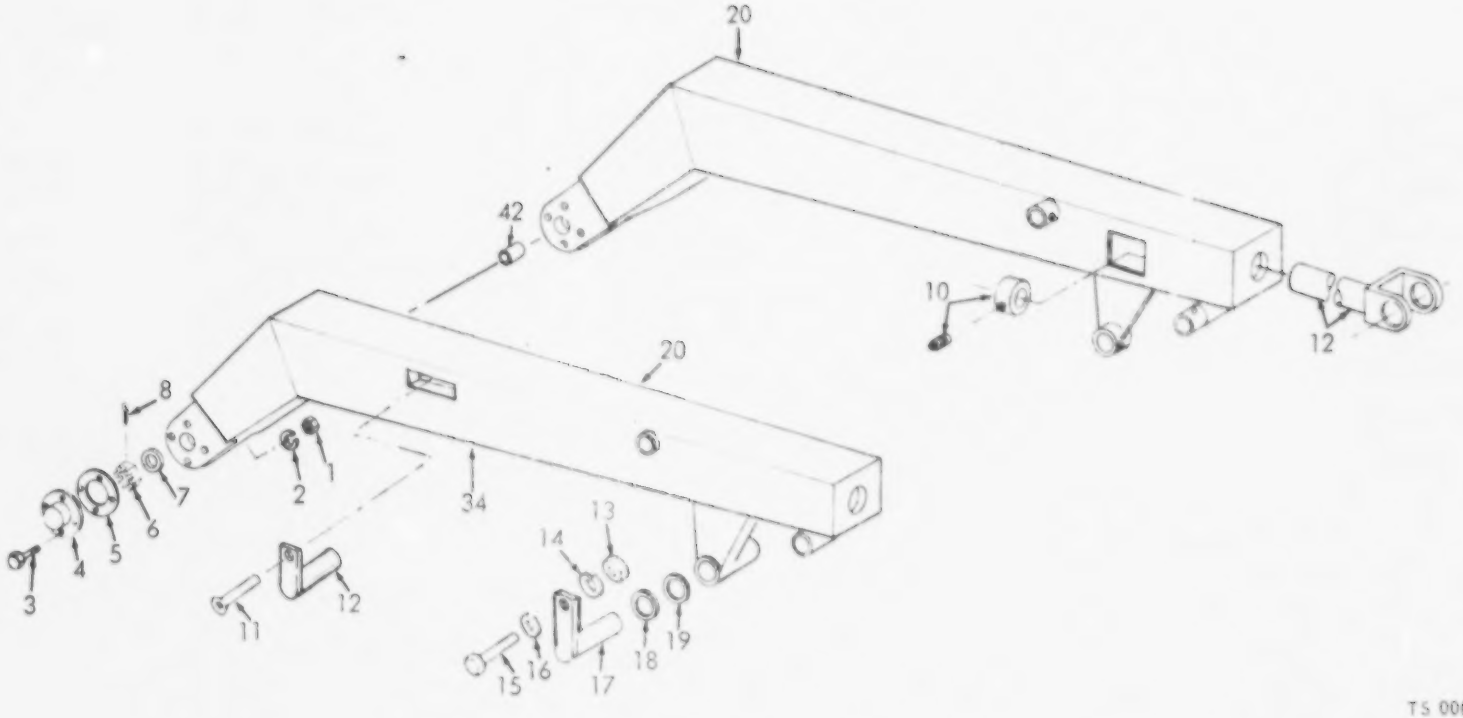
(3) Remove 4 x 6 wood members from under crawler assembly. Remove crawler drive chain assembly.

(4) Remove nut (1, fig. 3-42), lockwasher (2), screw (3), cap (4), and spacer (5). Remove cotter pin (6), nut (7), and spacer (8). Remove collar (9) from clevis rod (10).

(5) Remove screw (11) and pin (12) which fasten the hydraulic ram to the leveling arm. Remove nut (13), lockwasher (14), screw (15), flatwasher (16), pivot pin (17), and washers (18 and 19). The leveling arm (20) is now free to be removed. Remove self-aligning bearing (21) from leveling arm.

(6) Refer to TM 5-3895-275-12, paragraph 4-81, and remove truck push rollers.

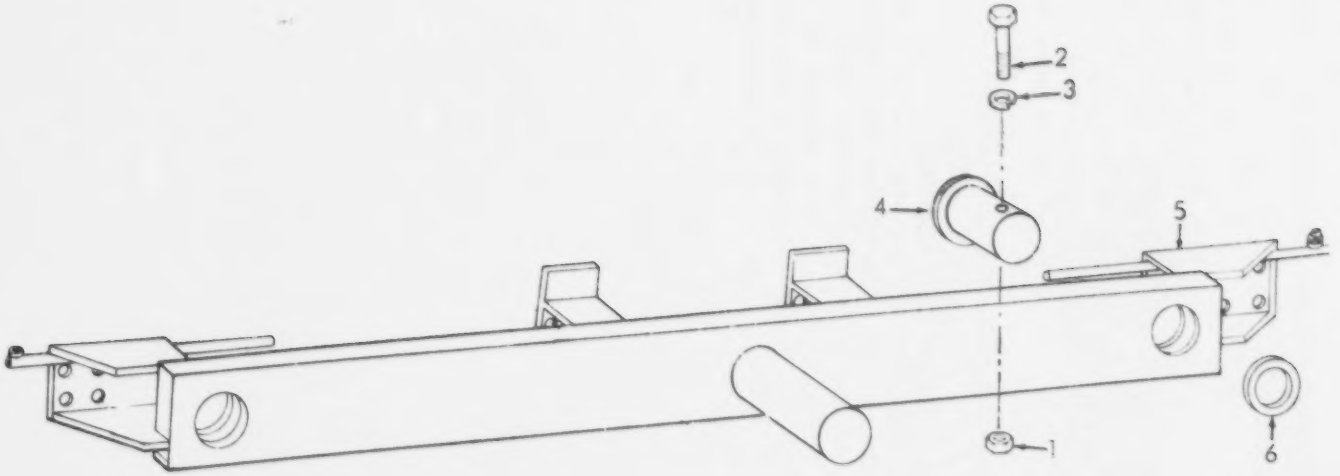
(7) Remove nut (1, fig. 3-43), bolt (2), lockwasher (3), pin (4), oscillating axle (5), and washer (6).



TS 000847

1. Nut
2. Lockwasher
3. Screw
4. Cap
5. Spacer
6. Cotter pin
7. Nut
8. Spacer
9. Collar
10. Clevis rod
11. Screw
12. Pin
13. Nut
14. Lockwasher
15. Screw
16. Flatwasher
17. Pivot pin
18. Washer
19. Washer
20. Leveling arm
21. Bearing

Figure 3-42. Leveling arm



TS 000848

1. Nut
2. Bolt
3. Lockwasher
4. Pin
5. Oscillating axle
6. Washer

Figure 3-43. Oscillating axle.

KEY for figure 3-44.

1. Nut
2. Lockwasher
3. Screw
4. Nut
5. Lockwasher
6. Screw
7. Collar
8. Screw
9. Lockwasher
10. Flatwasher
11. Cover
12. Nut
13. Spring seat
14. Spring
15. Bolt
16. Crawler track take-up
17. Nut
18. Bolt
19. Link pin
20. Crawler link
21. Nut
22. Lockwasher
23. Screw
24. Keeper bar
25. Lubrication fitting
26. Nut
27. Flatwasher
28. Idler shaft
29. Nut
30. Screw
31. Sprocket
32. Idler hub
33. Sleeve bearing
34. Lubrication fitting
35. Cotter pin
36. Pin
37. Truck roller
38. Roller shaft
39. Flatwasher
40. Roller
41. Bushings
42. Screw
43. Lockwasher
44. Cover
45. Shaft
46. Crawler frame
47. Nut
48. Screw
49. Sprocket
50. Nut
51. Lockwasher
52. Screw
53. Sprocket
54. Hub
55. Sleeve bearing

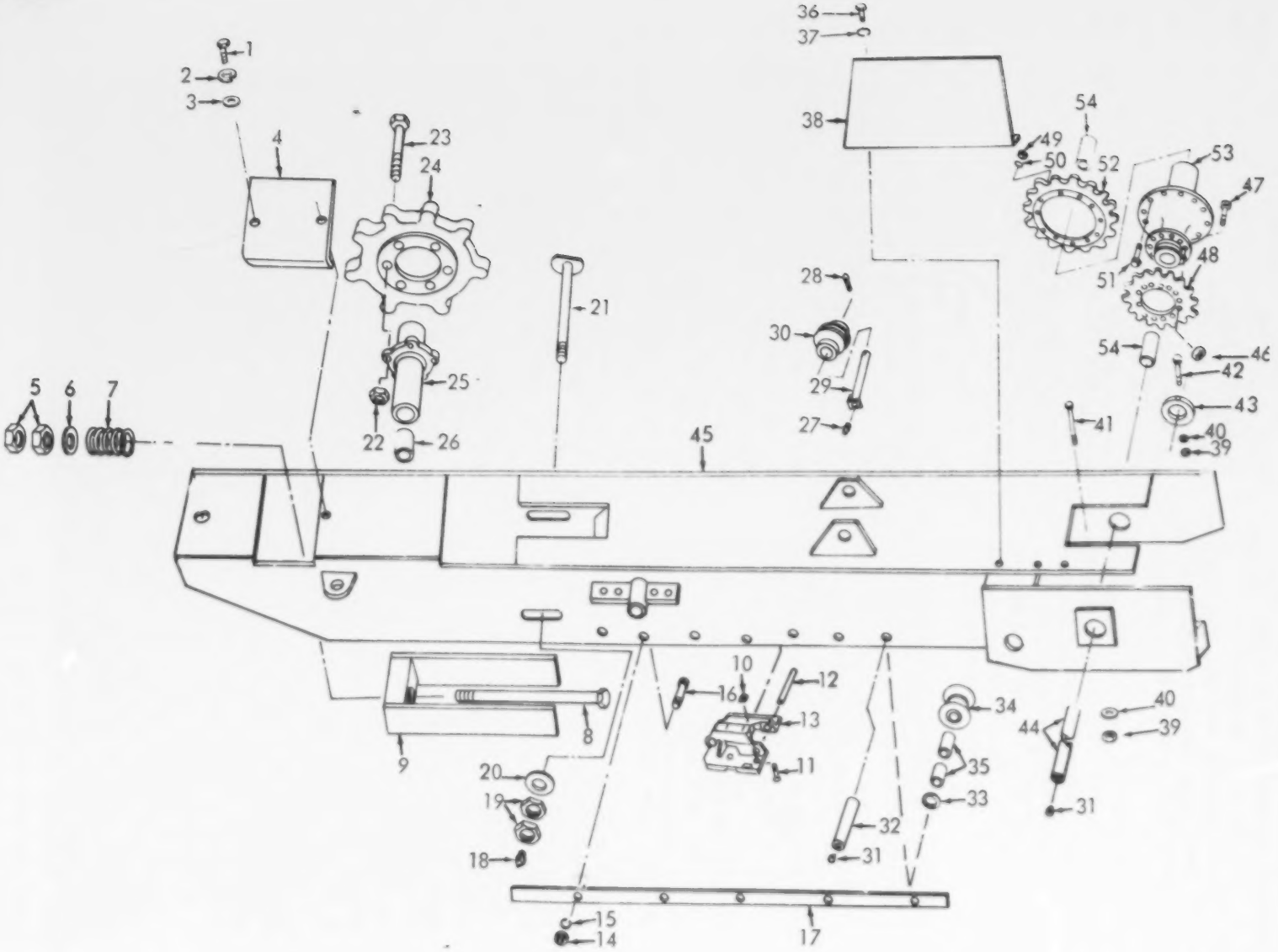


Figure 3-44. Crawler assembly.

(8) Remove nut (1, fig. 3-44), lockwasher (2), screw (3), nut (4), lockwasher (5), screw (6), and collar (7), from sprocket shaft.

(9) Remove hydraulic ram hose and remove rear corner frame plate. Using a suitable lifting device, remove crawler and track assembly.

c. Disassembly.

(1) Remove screw (8, fig. 3-44), lockwasher (9), flatwasher (10), and cover (11), from crawler frame. Remove nut (12), spring seat (13), spring (14), bolt (15), and crawler take-up (16).

(2) Remove nut (17), bolt (18), link pin (19), and crawler link (20). Remove nut (21), lockwasher (22), screw (23), and keeper bar (24).

NOTE

Track assembly can be removed as an assembly by removing one link and pin, but can be repaired only by replacing individual links and pins.

(3) Remove lubrication fitting (25), nut (26), flatwasher (27), idler shaft (28), and remove idler sprocket and hub. Remove nut (29) and screw (30) and separate idler shaft sprocket (31) and idler hub (32). Remove sleeve bearing (33) from idler hub.

(4) Remove lubrication fitting (34), cotter pin (35), pin (36), and track roller (37) from crawler frame. Remove roller shaft (38), flatwasher (39), and roller (40). Remove bushings (41) from roller.

(5) Remove screw (42), lockwasher (43), and cover (44). Remove shaft (45) and remove sprocket and hub from crawler frame (46).

(6) Remove nut (47), screw (48), and sprocket (49) from hub. Remove nut (50), lockwasher (51), screw (52), and sprocket (53), from hub (54). Remove sleeve bearing (55) from hub.

d. Cleaning, Inspection and Repair.

(1) Clean all parts in cleaning solvent and dry thoroughly.

(2) Inspect all crawler links for cracks, breaks, or excessive wear. Replace defective links.

(3) Inspect crawler link connecting pins for cranks, breaks, or excessive wear. Replace all defective pins.

(4) Inspect oscillating axle for cracks, breaks, or distortion. Replace or repair as necessary.

(5) Inspect all roller and sprocket shafts for cracks, breaks, and scoring. Replace a defective shaft.

(6) Inspect sprockets for cracks, breaks, or chipped teeth. Replace a defective sprocket.

(7) Inspect bushings and flanged rollers for cracks, breaks, or excessive wear. Replace a defective bushing or roller.

(8) Inspect crawler frame for cracks, breaks, distortion, or other damage. Replace a damaged or defective frame.

e. Reassembly.

(1) Press sleeve bearings (55) in hub (54). Position sprocket (53) on hub (54), and secure with screw (52), lockwasher (51), and nut (50). Position sprocket (49) on hub (54) and screw (48) and nut (47).

(2) Position sprocket and hub in crawler frame (46) and install shaft (45). Install cover (44), and secure with lockwasher (43) and screw (42).

(3) Press sleeve bearing (41) in roller (40). Position roller in crawler frame and install flatwasher (39) and roller shaft (38). Position track roller (37), in crawler frame and install pin (36), cotter pin (35), and lubrication fitting (34).

(4) Press sleeve bearing (33) in idler hub (32). Position sprocket (31) on idler hub and secure with screw (30), and nut (29). Position idler hub and sprocket in crawler frame and install idler shaft (28). Install flatwasher (27), nut (26), and lubrication fitting (25) on idler shaft.

(5) Install keeper bar (24) on crawler frame and secure with screw (23), lockwasher (22), and nut (21). Position assembled track assembly on crawler assembly and install crawler link (20), link pin (19), bolt (18), and nut (17).

(6) Position crawler take-up (16) on crawler assembly and install bolt (15), spring (14), spring seat (13), and nut (12). Position cover (11) on crawler frame and secure with flatwasher (10), lockwasher (9), and screw (8).

f. Installation.

(1) Using a suitable lifting device, install crawler and track assemblies under paving machine. Install rear corner frame plates and connect hydraulic ram hoses.

(2) Install collar (7, fig. 3-44) on sprocket shaft and install screw (6), lockwasher (5), nut (4), screw (3), lockwasher (2), and nut (1).

(3) Install washer (6, fig. 3-43) and oscillating axle (5) on crawler frames. Secure oscillating axle to crawler frame with pin (4), lockwasher (3), bolt (2), and nut (1).

(4) Refer to TM 5-3895-275-12, paragraph 4-81, and install truck push rollers.

(5) Install self-aligning bearing (21, fig. 3-42), in leveling arm (20). Position leveling arm on crawler frame and on clevis rod (10). Install washers (19 and 18), pivot pin (17), flatwasher (16), screw (15), lockwasher (14), and nut (13). Position hydraulic ram into position and install pin (12) and screw (11).

(6) Install collar (9) on clevis rod (10). Tighten setscrews on collar and install safety wire. Install spacer (8), nut (7), and cotter pin (6). Install spacer (5), cap (4), screw (3), lockwasher (2), and nut (1).

(7) Install crawler drive chain assembly.

(8) With hydraulic jacks, raise the tractor unit and remove all wood blocks.

g. Crawler Drive Chain Adjustment (*Fig. 3-45*)

(1) Loosen three gear box bolts (1).

(2) Loosen turnbuckle locknut (2).

(3) Adjust turnbuckle (3) to obtain correct chain tension.

(4) Tighten nut (2) and bolts (1).

3-24. Crawler Drive Shaft and Couplings (Fig. 3-46)

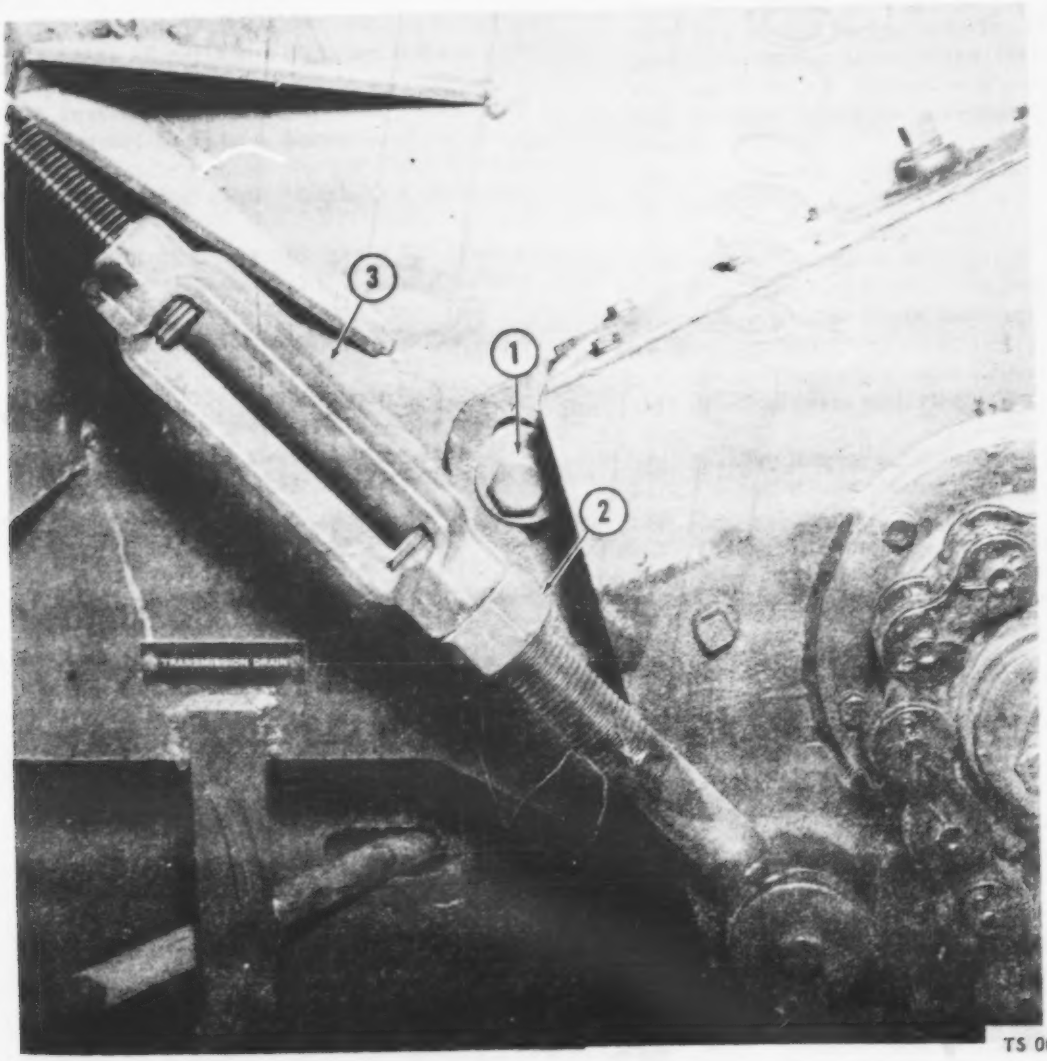
a. Removal.

(1) Remove deck plates over feeder screw drive clutch assemblies and disconnect feeder drive screw drive chain.

(2) Disconnect and remove drive shaft coupling chains (1).

(3) Remove drive shaft couplings (2, 3, 4, and 5), and remove key (6) from drive shaft.

(4) Disconnect feeder screw drive clutch linkage and remove clutch assembly.



TS 000850

1. Bolt
2. Nut
3. Turnbuckle

Figure 3-45. Crawler drive chain adjustment.

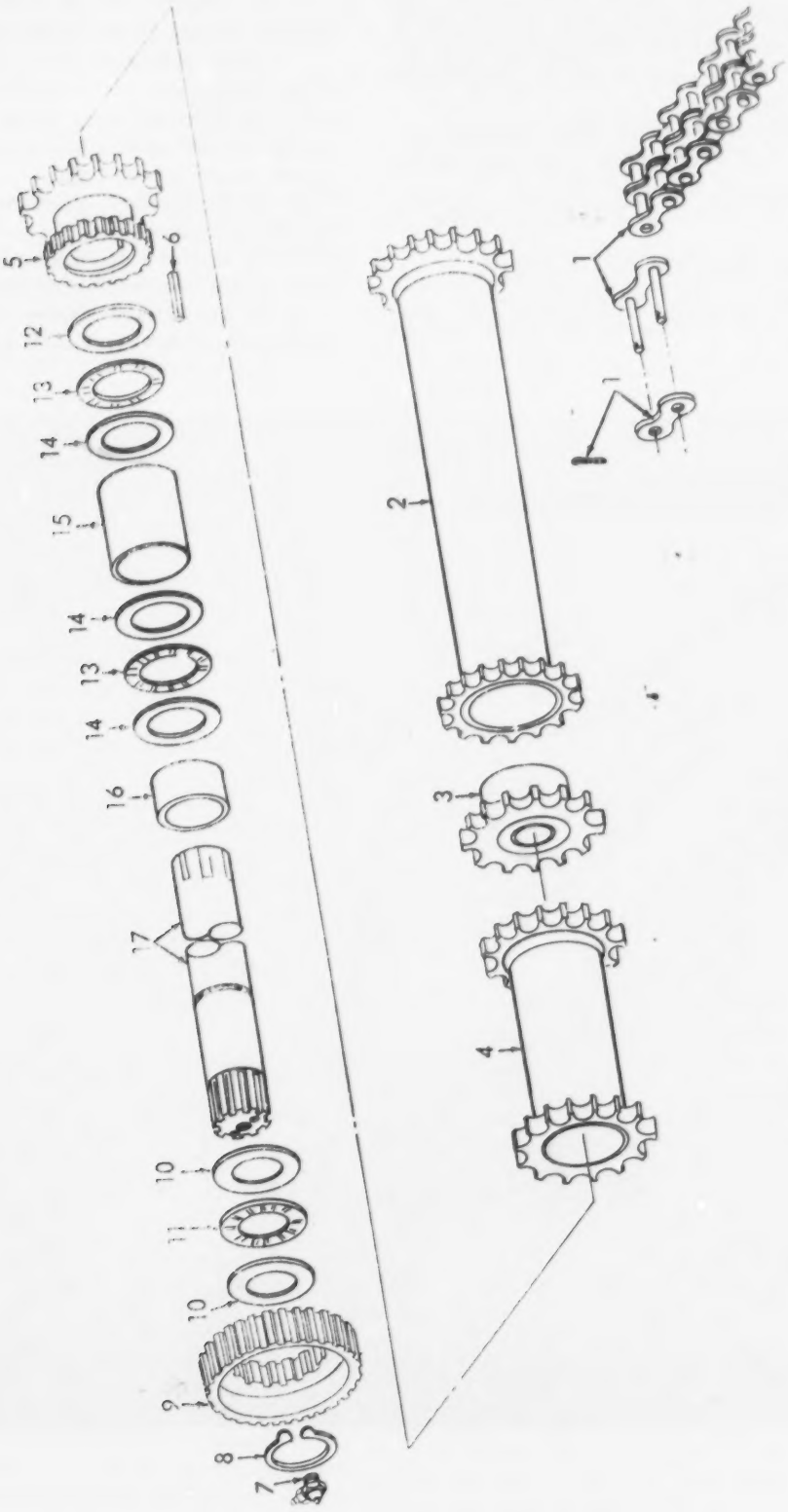


Figure 3-46. Clutch drive shaft and couplings.

KEY for figure 3-46.

1. Coupling chains
2. Coupling
3. Coupling
4. Coupling
5. Coupling
6. Key
7. Lubrication fitting
8. Retaining ring
9. Hub
10. Seat
11. Needle bearing
12. Thrust washer
13. Needle bearing
14. Seat
15. Spacer
16. Sleeve bearing
17. Drive shaft

(5) Remove lubrication fitting (7), retaining ring (8), hub (9), seat (10), and needle bearing (11).

(6) Remove thrust washer (12), needle bearing (13), seat (14), spacer (15), sleeve bearing (16), and drive shaft (17).

b. Cleaning and Inspection.

(1) Clean all parts in a cleaning solvent and dry thoroughly.

(2) Inspect chains for cracks, breaks, or excessive wear. Replace a defective chain.

(3) Inspect couplings for cracks, breaks, chipped or missing teeth. Replace a defective coupling.

(4) Inspect bearings and seats for cracks, breaks, or excessive wear. Replace a defective bearing or seat.

(5) Inspect shaft for cracks, breaks, or signs of wear. Replace a defective shaft.

c. Installation.

(1) Install drive shaft (17) through crawler drive gear box. Install sleeve bearing (16), seat (14), and needle bearing (13). Install spacer (15), seat (14), needle bearing (13), and thrust washer (12).

(2) Install seat (10), needle bearing (11), hub (9), retaining ring (8) and lubrication fitting (7).

(3) Install feeder screw drive cluth assembly and connect linkage.

(4) Position key (6) on drive shaft and install coupling (5). Install couplings (4, 3, and 2).

(5) Install and connect coupling chains (1).

(6) Install and connect feeder screw drive chain. Install deck plates over feeder screw drive clutch assemblies.

3-25. Steering Clutch (fig. 3-27)

a. Removal.

(1) Refer to paragraph 3-23 and remove retaining ring and hub.

(2) Remove retaining ring (1, fig. 3-47), and remove steering clutch assembly.

b. Disassembly.

CAUTION

Before removing capscrews to dismantle the clutch assembly a suitable clamping device should be devised to hold the cover and spring housing together since they are under spring tension. If this precaution is not taken when removing the capscrews, the springs will jump out and possible injury to personnel could result.

(1) Remove bolt (2), lockwasher (3), cover (4), and spacer (5).

(2) Remove clutch discs (6 and 7), retaining ring (8), and power plate (9).

(3) Remove spring seat (10), spring (11), ball (12), and insert (13). Press bearing (14) from clutch housing (15).

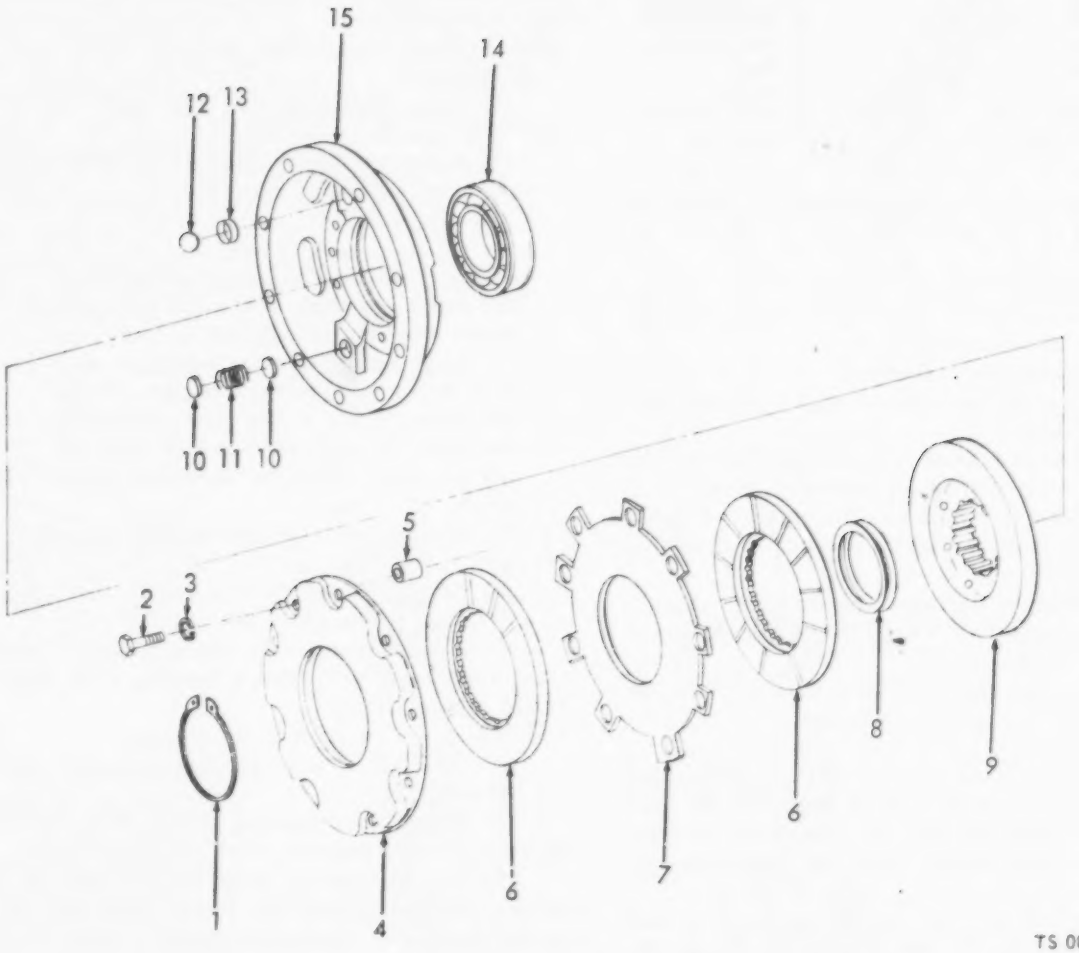
c. Cleaning, Inspection, and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect bearings for cracks, breaks, or excessive wear. Replace a defective bearing.

(3) Inspect springs and spring seats for cracks, breaks, distortion, and weak spring tension. Replace a defective spring or seat.

(4) Inspect power plate and disc for cracks, breaks, or signs of wear. Replace a defective power plate or disc.



1. Retaining ring
2. Bolt
3. Lockwasher
4. Cover
5. Spacer
6. Disc
7. Disc
8. Retaining ring
9. Power plate
10. Seat
11. Spring
12. Ball
13. Insert
14. Bearing
15. Housing

Figure 3-47. Steering clutch.

d. Clutch Lining Replacement. Clutch lining may be replaced without removing clutch assembly from its mounting.

(1) Remove bolts (2, fig. 3-47), lockwasher (3), cover (4), and spacer (5).

(2) Replace discs (6 and 7) as required and reverse above sequence for reassembly.

(3) Refer to TM 5-3895-275-12, paragraph 4-78, for clutch adjustment.

e. Reassembly.

(1) Press bearing (14) into clutch housing (15). Install seat (13) and ball (12) in housing. Place housing in a press or similar device to compress springs. Install spring seats (10) and springs (11).

(2) Install power plate (9), retaining ring (8), and clutch disc (7 and 6).

(3) Position spacers (5) in position and install cover (4). Secure cover with lockwashers (3) and bolt (2). Remove assembled clutch assembly from press or similar device.

f. Installation.

(1) Position clutch assembly on clutch shaft and install retaining ring (1).

(2) Refer to paragraph 3-25 and install hub and retaining ring.

(3) Adjust the clutch (TM 5-3895-275-12, para 4-78).

3-26. Steering Brakes and Clutch Release Assembly

a. Removal.

(1) Refer to paragraph 3-24 and remove the steering clutch.

(2) Remove retaining ring (1, fig. 3-48), plate (2) and screw (3).

(3) Remove cotter pin (4) and pin (5). Disconnect brake linkage and remove clutch release and brake assembly.

b. Disassembly.

(1) Remove nut (6), flatwasher (7), collar (8), pin (9), and take-up rod (10). Remove spring (11), flatwasher (12), ball insert (13), and ball (14) from backing plate (15).

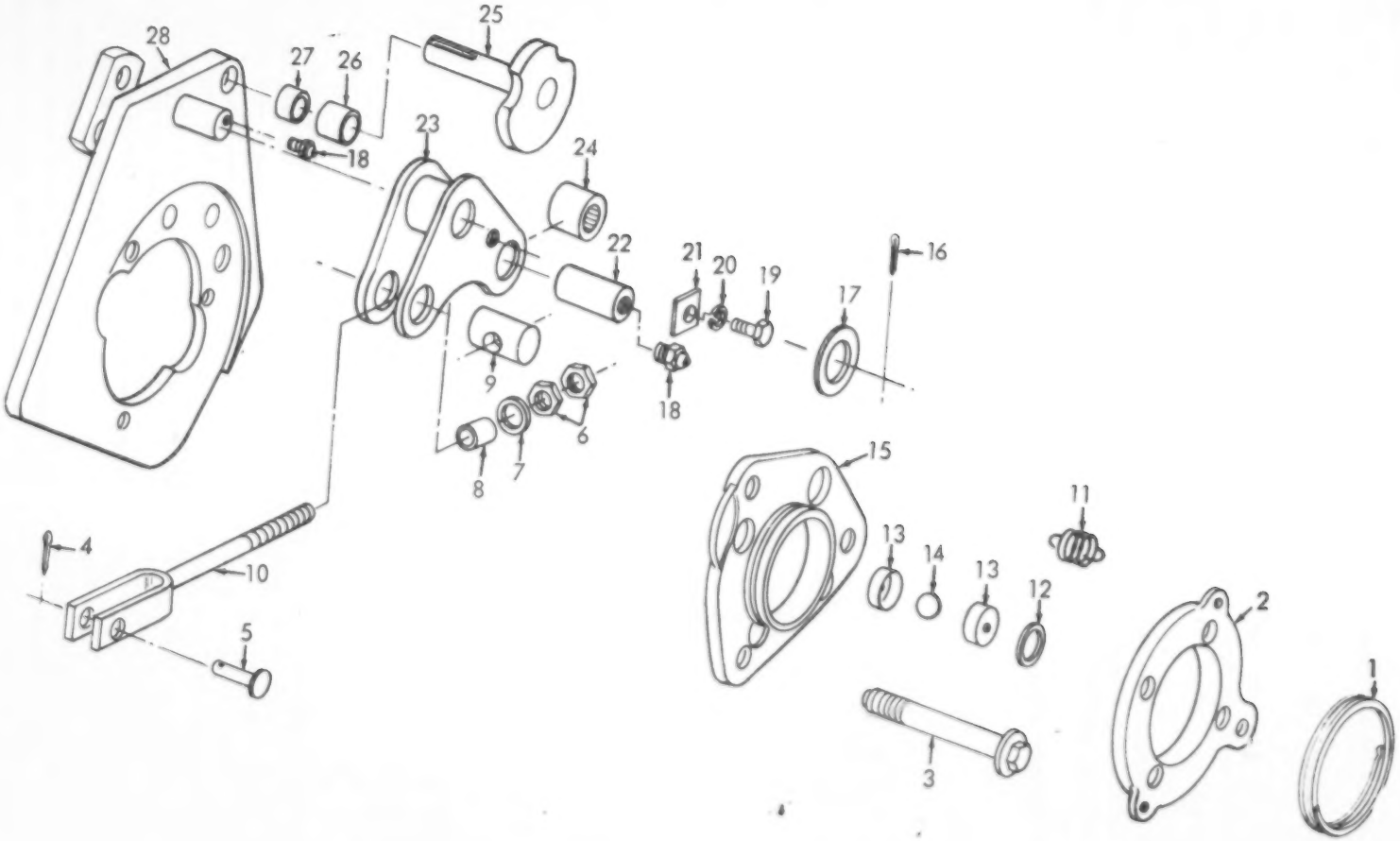
(2) Remove cotter pin (16), flatwasher (17), and lubrication fittings (18). Remove screw (19), lockwasher (20), lock bar (21), pin (22), and remove clutch lever (23) from brake control plate. Remove needle bearing (24), from clutch lever.

(3) Remove cam (25) and bushings (26 and 27), from control plate (28).

(4) Remove cotter pin (1, fig. 3-49), pin (2), nut (3), flatwasher (4), collar (5), and rod (6). Remove pin (7), brake lever (8), and key (9).

(5) Remove bushing (10), and disc assembly (11). Remove nut (12) stud (13), link yoke (14), spring (15), link (16), disc (17), and ball (18).

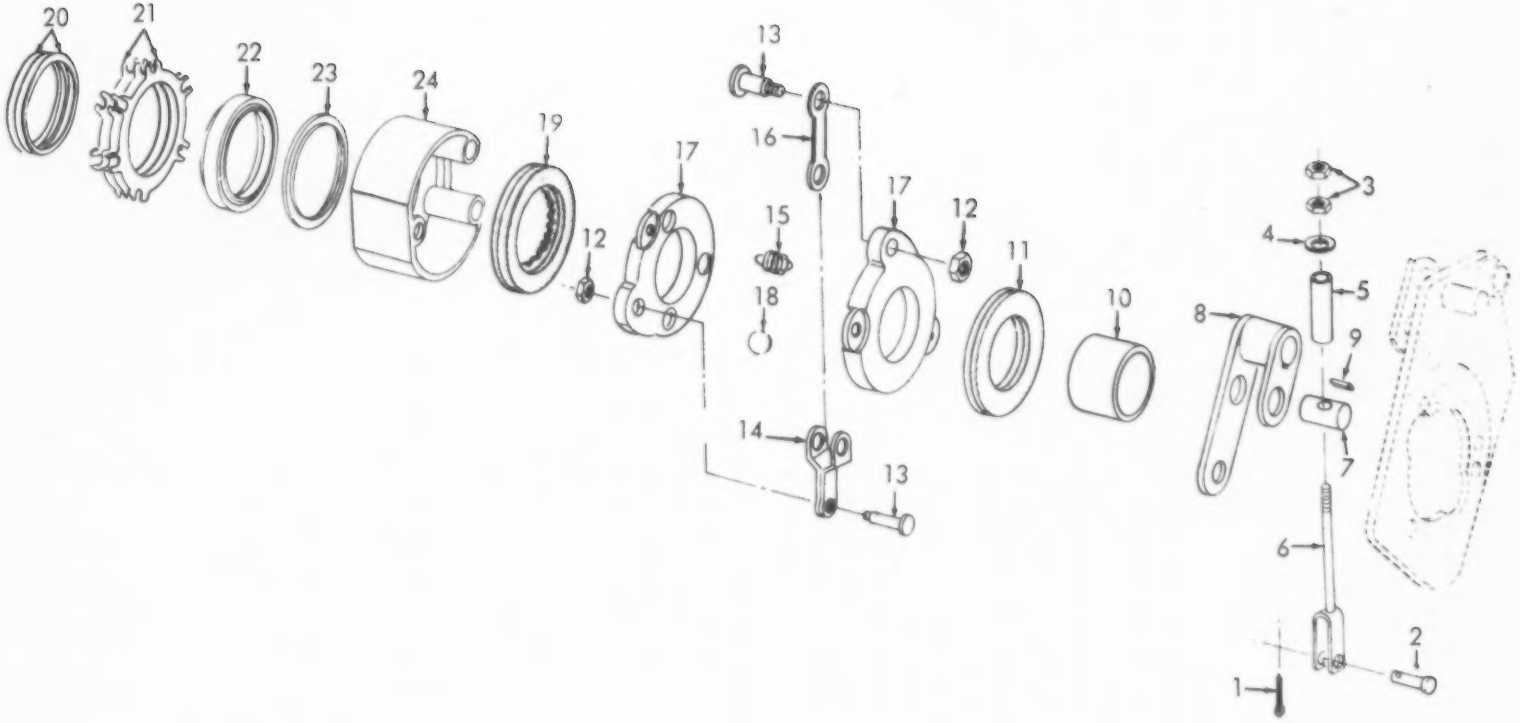
(6) Remove disc assembly (19) and shims (20 and 21). Remove seals (22 and 23) from brake housing (24).



TS 000853

1. Retaining ring
2. Plate
3. Screw
4. Cotter pin
5. Pin
6. Nut
7. Flatwasher
8. Collar
9. Pin
10. Rod
11. Spring
12. Flatwasher
13. Insert
14. Ball
15. Plate
16. Cotter pin
17. Flatwasher
18. Lubrication fitting
19. Screw
20. Lockwasher
21. Lock bar
22. Pin
23. Clutch lever
24. Needle bearing
25. Cam
26. Bushing
27. Bushing
28. Plate

Figure 3-48. Steering brake and clutch release assembly.



TS 000854

1. Cotter pin
2. Pin
3. Nut
4. Flatwasher
5. Collar
6. Rod
7. Pin
8. Brake lever
9. Key
10. Bushing
11. Disc assembly
12. Nut
13. Stud
14. Link yoke
15. Spring
16. Link
17. Disc
18. Ball
19. Disc assembly
20. Shim
21. Shim
22. Seal
23. Seal
24. Housing

Figure 3-49. Steering brake.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect springs, spring seats and hardware for cracks, breaks, distortion, or weak spring tension. Replace damaged or defective parts.

(3) Inspect disc assemblies for cracks, breaks, or signs of excessive wear. Replace defective parts.

(4) Inspect brake housing for cracks, breaks, or other damage. Replace a defective brake housing.

d. Reassembly.

(1) Install seals (23 and 22, fig. 3-49) in brake housing (24). Install shims (21 and 20) and disc assembly (19).

(2) Install ball (18), between disc (17). Install link (16), spring (15), and link yoke (14). Secure link and link yoke to disc with stud (13), and nut (12). Install disc assembly (11), and bushing (10) in disc.

(3) Position key (9) in brake lever (8) and install lever. Position pin (7) in brake lever and install rod (6). Install collar (5), flatwasher (4), and nut (3). Install pin (2) and cotter pin (1).

(4) Press bushings (27 and 26, fig. 3-48) in control plate (28). Install cam (25) in control plate.

(5) Install needle bearing (24) in clutch lever (23). Install clutch lever on control plate and install pin (22). Secure pin with lock bar (21), lockwasher (20), and screw (19). Install lubrication fitting (18). Secure clutch lever to control plate with flatwasher (17) and cotter pin (16).

(6) Install ball insert (13) and ball (14) in backing plate (15). Install flatwasher (12) and spring (11). Position pin (9) in clutch lever and install take-up rod (10). Install collar (8), flatwasher (7), and nuts (6) on take-up rod. Assemble clutch release assembly on brake assembly and secure with screw (3).

e. Installation.

(1) Position brake and clutch release assembly on crawler drive gear box shaft.

(2) Install pin (5), cotter pin (4), plate (2), and retaining ring (1).

(3) Refer to paragraph 3-24 and install the steering clutch.

(4) Refer to TM 5-3895-275-12, paragraph 4-78, for brake adjustment.

3-27. Crawler Drive-Gear Box Assembly (Fig. 3-50)

a. Removal.

(1) Remove drain plug (1) and drain lubricant from gear box.

(2) Remove bolts (2), lockwashers (3), flatwasher (4), flatwasher (5), and turnbuckle (6).

(3) Remove screw (7), lockwasher (8), flatwasher (9), spacer (10), flatwasher (11), and crawler drive gear box assembly.

b. Disassembly.

(1) Remove elbow (12), nipple (13), elbow (14), nipple (15), elbow (16), nipple (17), and elbow (18).

(2) Remove bolt (19), lockwasher (20), and cover (21). Remove breather (22), plug (23), and gasket (24).

KEY for figure 3-50.

1. Plug
2. Bolt
3. Lockwasher
4. Flatwasher
5. Flatwasher
6. Turnbuckle
7. Screw
8. Lockwasher
9. Flatwasher
10. Spacer
11. Flatwasher
12. Elbow
13. Nipple
14. Elbow
15. Nipple
16. Elbow
17. Nipple
18. Elbow
19. Elbow
20. Lockwasher
21. Cover
22. Breather
23. Plug
24. Gasket
25. Screw
26. Lockwasher
27. End cap
28. Flatwasher
29. Sprocket
30. Screw
31. Lockwasher
32. Seal retainer
33. Gasket
34. Seal
35. Screw
36. Lockwasher
37. Cap
38. Gasket
39. Screw
40. Lockwasher
41. End cap
42. Bearing
43. Screw
44. Seal retainer
45. Shim
46. Seal
47. Shaft
48. Cone and rollers
49. Bearing cup
50. Housing
51. Spacer
52. Cone and rollers
53. Bearing cup
54. Shim
55. Spacer
56. Gear
57. Shaft
58. Cone and rollers
59. Bearing cup
60. Seal

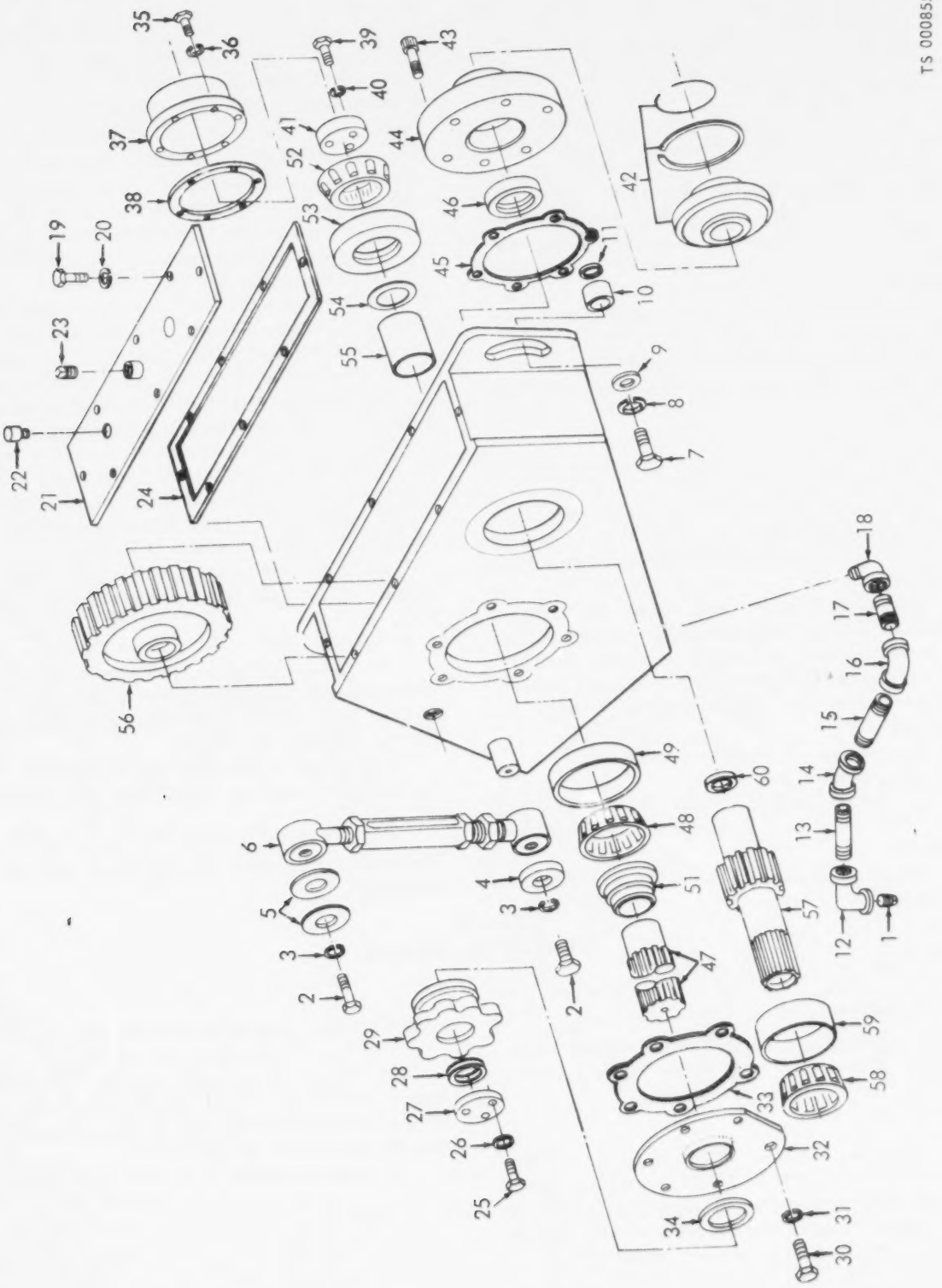


Figure 3-50. Crawler drive gear box.

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(3) Remove screw (25), lockwasher (26), end cap (27), and flatwasher (28). Use a suitable puller and remove sprocket (29).

(4) Remove screw (30), lockwasher (31), seal retainer (32), and gasket (33). Remove seal (34), from seal retainer.

(5) Remove screw (35), lockwasher (36), cap (37), and gasket (38). Remove screw (39), lockwasher (40), and end cap (41). Remove bearing (42), screw (43), seal retainer (44), and gasket (45). Remove seal (46) from seal retainer.

(6) Remove shaft (47), cone and rollers (48), and bearing cup (49) from gear box housing (50). Remove spacer (51) from shaft. Remove cone and rollers (52), bearing cup (53), shim (54), spacer (55), and gear (56), from gear box housing.

(7) Remove shaft (57), cone and rollers (58), bearing cup (59), and seal (60) from gear box housing.

c. Cleaning, Inspection and Repair.

(1) Clean alll parts with a cleaning solvent and dry thoroughly.

(2) Inspect gear box housing for cracks, or breaks. Housing may be welded if cracks or breaks do not extend into bearing bores or bolting surfaces.

(3) Inspect shaft and gear for cracks, chipped, worn, or damaged teeth. Inspect splines for wear. Replace a worn or damaged shaft.

(4) Inspect all bearings for cracks, breaks, and excessive wear. Replace worn or defective bearings.

(5) Replace all seals and gaskets.

d. Reassembly.

(1) Install shaft (57), seal (58), bearing cup (60), and cone and rollers (59) in gear box assembly.

(2) Install spacer (51) on shaft (47). Position shaft and spacer in gear box housing and install gear (56), spacer (55), and shim (54). Install bearing cups (53 and 49), and cone and rollers (52 and 48). Use shims (54), to obtain 0.001 – 0.003 inch end play of shaft (47).

(3) Install seal (46), in seal retainer (44). Place seal retainer shim (45), and seal retainer (44), on housing and install screw (43). Install bearing (42) in seal retainer. Install end cap (41) and secure with lockwasher (40) and screw (39). Install lockwires into all screws. Place cap gasket (38) and cap (37) on housing and secure with lockwasher (36) and screw (35). Use shim (45) to obtain 0.001 – 0.003 inch end play of shaft (47).

(4) Install seal (34) in seal retainer (32). Place seal retainer (32) and gasket (33) on housing and install lockwasher (31), and screw (30).

(5) Install sprocket (29) on shaft and install flatwasher (28) and end cap (27). Secure end cap to shaft with lockwasher (26) and screw (25).

(6) Install breather (22) and plug (23) in cover (21). Place gasket (24) on housing and install cover (21). Secure cover to housing with lockwasher (20) and screw (19).

(7) Install elbow (18), nipple (17), elbow (16), nipple (15), elbow (14), nipple (13), and elbow (12).

e. Installation.

(1) Using a suitable lifting device place gear box assembly on machine and secure with flatwasher (11), spacer (10), flatwasher (9), lockwasher (8), and screw (7).

(2) Install turnbuckle (6), and secure with flatwashers (5 and 4), lockwasher (3), and bolts (2).

(3) Install drain plug (1). Refer to current lubrication order and add lubricant to gear box assembly.

Section VI. FRAME

3-28. Description

The welded frame supports the engine, transmission, screed unit, and hopper. The frame is carried on the crawler assemblies.

3-29. Frame

a. Removal. Refer to other sections of this manual and TM 5-3895-275-12 to remove parts and assemblies necessary to allow frame repair or replacement. Frame replacement should not be done unless damage is beyond repair.

b. Cleaning Inspection and Repair.

(1) Clean frame with live steam.

(2) Inspect for cracks or breaks in the frame. Repair cracks or breaks by welding. Be sure strength of weld is sufficient to support weight of assemblies carried on the frame.

(3) Replace frame if beyond weld repair.

Section VII. HYDRAULIC SYSTEM

3-30. General

The hydraulic system activates the hydraulic ram hoist and the tamper drive hydraulic motor. The hydraulic pump is V-belt driven from the engine power take-off.

3-31. Hydraulic Pump (Fig. 3-51)

a. Removal.

(1) Refer to TM 5-3895-275-12, paragraph 4-87 and remove hydraulic pump drive belt.

(2) Remove hose assembly (1), connector (2), tee (3), and connector (4). Remove nipple (5), elbow (6), nipples (7), and elbow (8).

(3) Remove setscrew (9) and pump drive pulley (10). Loosen adjusting screw nut (11) and remove screw (12).

(4) Remove nut (13), lockwasher (14), screw (15), and hydraulic pump (16).

(5) Remove nut (17), lockwasher (18), flatwasher (19), bolt (20), and support (21).

(6) Remove nut (22), lockwasher (23), flatwasher (24), screws (25 and 26), and bracket (27).

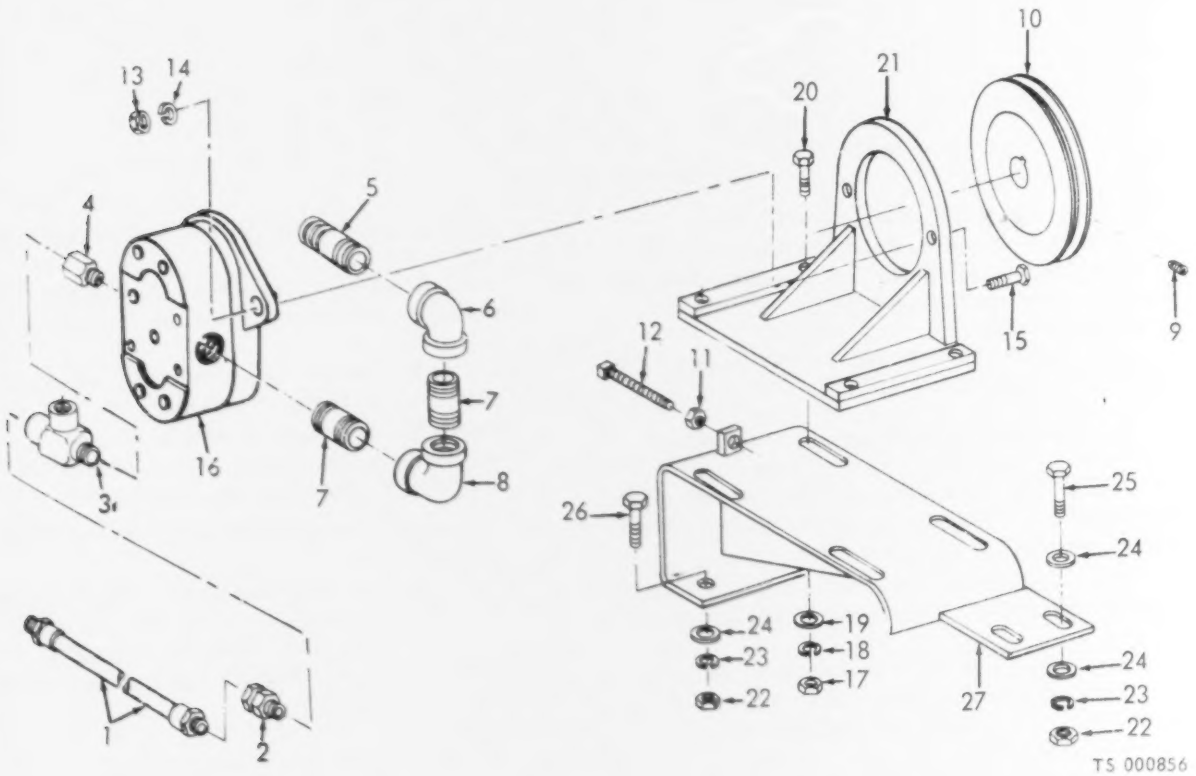
b. Disassembly (Fig. 3-52).

(1) Remove screw (1), seal retainer (2), O-ring (3), and seal (4) from front of pump assembly.

(2) Remove screws (5 and 7), lockwashers (6 and 8), and separate cover (9) from pump body.

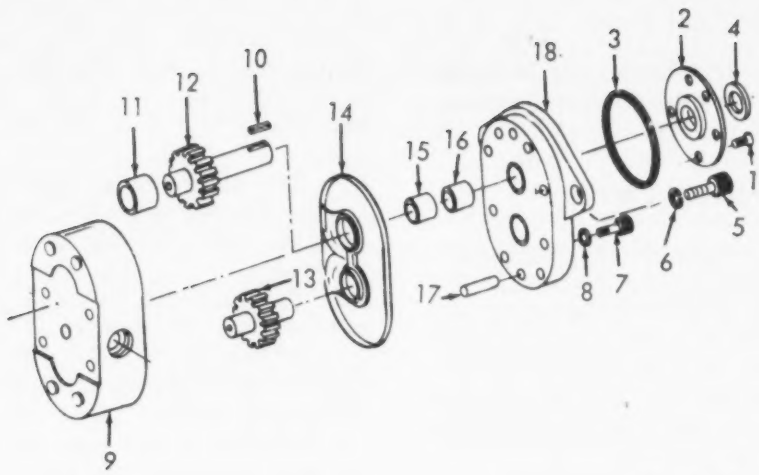
(3) Remove key (10), from shaft assembly. Remove sleeve bearing (11) and shaft assemblies (12 and 13).

(4) Remove wear plate and seal (14), sleeve bearings (15 and 16), and pin (17) from body (18).



1. Hose assembly
2. Connector
3. Tee
4. Connector
5. Nipple
6. Elbow
7. Nipple
8. Elbow
9. Setscrew
10. Pulley
11. Nut
12. Screw
13. Nut
14. Lockwasher
15. Screw
16. Hydraulic pump
17. Nut
18. Lockwasher
19. Flatwasher
20. Bolt
21. Support
22. Nut
23. Lockwasher
24. Flatwasher
25. Screw
26. Screw
27. Bracket

Figure 3-51. Hydraulic pump.



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1. Screw
2. Seal retainer
3. O-ring
4. Seal
5. Screw
6. Lockwasher
7. Screw
8. Lockwasher
9. Cover
10. Key
11. Sleeve bearing
12. Shaft assembly
13. Shaft assembly
14. Wear plate and seal
15. Sleeve bearing
16. Sleeve bearing
17. Pin
18. Body

Figure 3-52. Hydraulic pump.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts in cleaning solvent.

(2) Inspect all parts for wear or damage. Replace worn or damaged parts.

d. Reassembly.

(1) Install pin (17) and sleeve bearings (16 and 15) in pump body (18).

NOTE

When installing sleeve bearings in cover and body, make sure slot faces adjacent dowel holes.

(2) Install wear plate and seal (14) and shaft assemblies (13 and 14) in pump body. Install sleeve bearing (9) in pump cover.

(3) Install pump cover (9) on pump body and secure cover with lockwasher (8 and 6) and screws (7 and 5).

(4) Install seal (4) in seal retainer (2). Install O-ring (3) and seal retainer (2) on front of pump assembly. Secure seal retainer with screw (1).

e. Installation.

(1) Install bracket (27) on frame and secure with screws (26 and 25), flatwasher (24), lockwasher (23), and nut (22).

(2) Install support (21) on bracket and secure with bolt (20), flatwasher (19), lockwasher (18), and nut (17).

(3) Position hydraulic pump (16) on support (21), and secure with screw (15), lockwasher (14), and nut (13).

(4) Install adjusting screw (12) and nut (11). Install pulley (10) on pump shaft and secure with setscrew (9).

(5) Install elbow (8), nipple (7), elbow (6), and nipple (5). Install connector (4), tee (3), connector (2), and hose assembly (1).

(6) Refer to TM 5-3895-275-12, paragraph 4-87, and install hydraulic pump drive belt.

3-32. Hoist and Tamper Hydraulic Control Valve (Fig. 3-53)

a. Description. The hydraulic control valve consists of a 3-way spool valve and a pressure relief valve. All parts may be replaced individually except the plunger and housing which must be replaced as units.

b. Removal.

(1) Disconnect all hydraulic lines.

(2) Remove cotter pins (1 and 3), pin (2), link (4), grip (5), and lever (6) from hydraulic control valve.

(3) Remove connector (7) and nipple (8). Remove nut (9), lockwasher (10), flatwasher (11), screw (12), and remove control valve assembly from the paving machine.

c. *Disassembly.*

(1) Remove boot (13), retaining ring (14), disc (15), and spring (16). Remove screw (17), lockwasher (18), adapter (19), and packing (20).

(2) Remove cap (21), washer (22), spring (23), and detent pin (24). Remove plug (25), sleeve (26), gasket (27), and seal (28).

(3) Remove spool (29) and packing (30) from housing.

NOTE

Housing and spool must be replaced as a unit only.

(4) Remove capnut (31), nut (32), screw (33), and packing (34). Remove relief valve body (35), gasket (36), washer (37), spring (38), guide (39), and ball (40).

(5) Remove valve seat (41), packing (42), plug (43), packing (44), and poppet (45).

CAUTION

It is extremely important that all parts be kept clean at all times, and that all machined surfaces be protected from nicks, scoring, gouging, and other damage. Disassemble valve assembly only as far as is necessary.

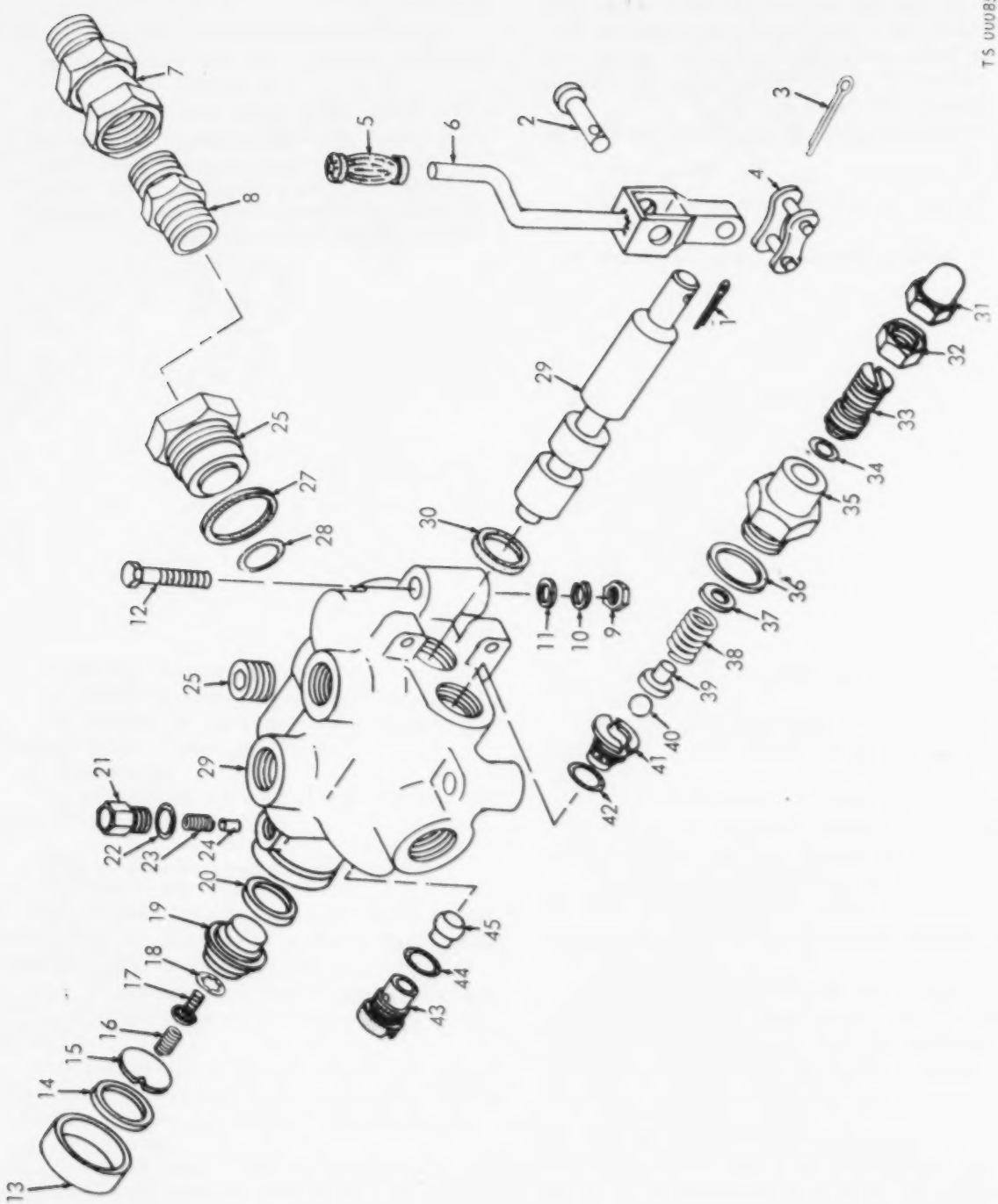


Figure 3-53. Hoist and tamper hydraulic control valve.

KEY for figure 3-53.

1. Cotter pin
2. Pin
3. Cotter pin
4. Link
5. Grip
6. Lever
7. Connector
8. Nipple
9. Nut
10. Lockwasher
11. Flatwasher
12. Screw
13. Boot
14. Retaining ring
15. Disc
16. Spring
17. Screw
18. Lockwasher
19. Adapter
20. Packing
21. Cap
22. Washer
23. Spring
24. Detent pin
25. Plug
26. Sleeve
27. Gasket
28. Seal
29. Spool
30. Packing
31. Capnut
32. Nut
33. Screw
34. Packing
35. Relief valve body
36. Gasket
37. Washer
38. Spring
39. Guide
40. Ball
41. Valve seat
42. Packing
43. Plug
44. Packing
45. Poppet

d. Cleaning, Inspection, and Repair.

(1) Clean all metal parts with cleaning solvent and dry thoroughly.

(2) Inspect valve housing and spool for scratches, burs, or signs of scoring. *Replacement of both the spool and housing is necessary if they are found to be worn or defective as they are a matched set.*

(3) Inspect relief valve seat, ball, spring, and detent adapter for scratches, burs, or other damage. Replace defective parts.

(4) Replace all O-rings and seals when rebuilding a valve.

(5) Inspect housing for cracks, stripped threads, or other damage which could affect operation.

e. Reassembly.

(1) Coat all seals with approved hydraulic oil before installing.

(2) Install poppet (45), packing (44), and plug (43). Install packing (42) and valve seat (41).

(3) Install ball (40), guide (39), spring (38), washer (37), gasket (36), and relief valve body (35). Install packing (34), screw (33), nut (32), and capnut (31). Install packing (30) and spool (29) in housing.

(4) Install seal (28), gasket (27), sleeve (26), and plug (25), in housing. Install detent pin (24), spring (23), washer (22), and cap (21) in housing.

(5) Install packing (20) and adapter (19) and secure with lockwasher (18) and screw (17). Install spring (16), disc (15), retaining ring (14), and boot (13).

f. Installation.

(1) Position hydraulic control valve assembly on paving machine and secure with screw (12), flatwasher (11), lockwasher (10), and nut (9). Install nipple (8) and connector (7).

(2) Install link (4), lever (6), and grip (5). Install pin (2) and cotter pins (1 and 3).

(3) Connect all hydraulic lines.

g. Relief Valve Adjustment.

(1) The screed hoist relief valve should be set at 2000 PSI. The tamper relief valve should be set at 1250 PSI.

(2) Remove the plug from the inlet port elbow and install a pressure gage.

NOTE

Both the screed hoist and tamper relief valves are adjusted the same way. The only difference is the PSI reading for each valve.

(3) Remove capnut (31, fig. 3-52) from the adjusting screw (33) and loosen nut (32).

(4) Start the engine and check reading of gage.

(5) Adjust the adjusting screw (33) until proper gage reading is obtained.

(6) Hold the screw in position and tighten the nut. Shut off engine and install the capnut over the adjusting screw. Remove pressure gage and install the plug.

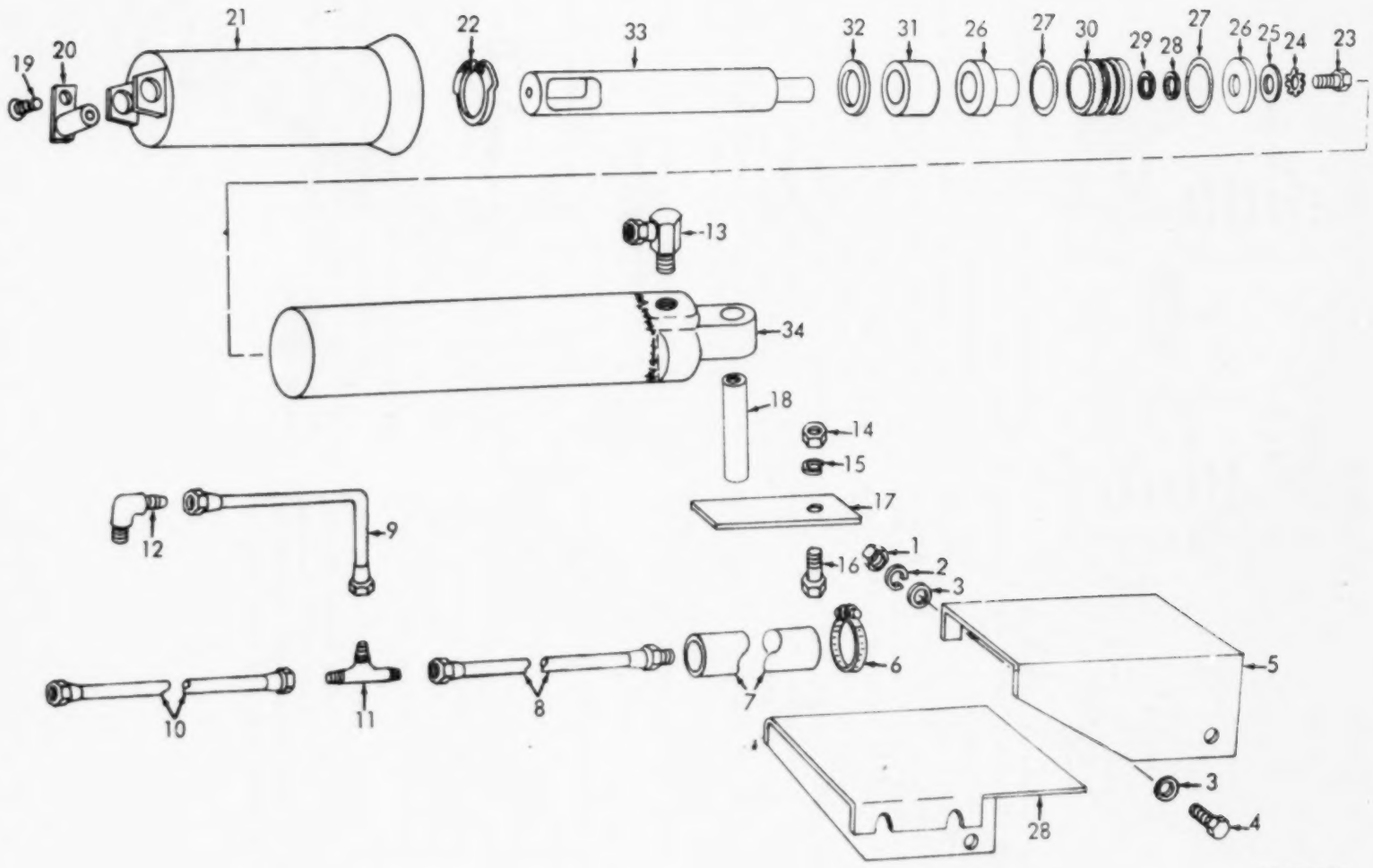


Figure 3-54. Hydraulic ram.

KEY for figure 3-54.

1. Nut
2. Lockwasher
3. Flatwasher
4. Screw
5. Guard
6. Clamp
7. Hose
8. Hose assembly
9. Hose assembly
10. Hose assembly
11. Tee
12. Elbow
13. Restrictor
14. Nut
15. Lockwasher
16. Screw
17. Lock plate
18. Pin
19. Screw
20. Pin
21. Hood
22. Retaining ring
23. Screw
24. Lockwasher
25. Retainer
26. Retainer
27. Ring
28. Washer
29. O-ring
30. Packing
31. Stuffing box
32. Ring
33. Rod
34. Cylinder

3-33. Hydraulic Ram (Fig. 3-54)

a. Description. The two hydraulic rams are provided for raising and lowering the screed. They are located on each side of the paving machine and are connected to the leveling arms.

b. Removal.

(1) Remove nut (1), lockwasher (2), flatwashers (3), screw (4), and guard (5), from the paving machine.

(2) Remove clamp (6) and protective hose (7). Remove hose assemblies (8, 9, and 10), tee (11), elbow (12), and restrictor (13).

(3) Remove nut (14), lockwasher (15), screw (16), lock plate (17), and pin (18). Remove screw (19), pin (20), hood (21), and remove the hydraulic ram from the paving machine.

c. Disassembly.

(1) Remove retaining ring (22), and remove assembled actuating rod and stuffing box from cylinder (34).

(2) Remove screw (23), lockwasher (24), retainer (25), and retainer (26). Remove ring (27), washer (28), O-ring (29), and packing (30), from actuating rod.

(3) Remove stuffing box (31), and ring (32), from actuating rod (33).

d. Cleaning, Inspection, and Repair.

(1) Clean all metal parts with cleaning solvent and dry thoroughly.

(2) Inspect cylinder for cracks, breaks, and signs of wear.

(3) Inspect actuating rod for damage and evidence of misalignment.

(4) Inspect stuffing box for wear or other damage.

(5) Inspect packing for scores, folded edges, and worn or torn sections.

(6) Replace parts as necessary.

e. Reassembly.

(1) Install ring (32) and stuffing box (31), on actuating rod (33).

(2) Install packing (30), O-ring (29), washer (28), and ring (27) on actuating rod. Install retainer (26) and retainer (25), and secure with lockwasher (24) and screw (23).

NOTE

Screw should be torqued to 10—15 ft-lbs. to seal packing properly. Then screw should be backed off approximately 1/8 inch. There should be approximately 1/32-to 1/16-inch gap between the end of piston and large retaining washer. Add 1/32 inch shim gaskets (furnished with packing set) until proper clearance is obtained. Torque screw to approximately 50-ft-lbs.

(3) Coat all seals and packings with approved hydraulic oil. Install assembled actuating rod and stuffing box in cylinder (34) and install retaining ring (22).

f. Installation.

(1) Install hydraulic ram on the paving machine and install pin (18) and lock plate (17). Secure lock plate with screw (16), lockwasher (15), and nut (14). Install hood (21), and pin (20). Secure pin with screw (19).

(2) Install restrictor (13) on hydraulic ram. Install elbow (12) and install tee (11) and hose assemblies (10, 9 and 8). Install protective hose (7) and secure with clamp (6).

(3) Position guard (5) on the paving machine and secure with screw (4), flatwashers (3), lockwashers (2), and nut (1).

3-34. Hydraulic Tank (Fig. 3-55)

a. Description. The hydraulic tank holds sufficient oil for the entire hydraulic system. It is a 30-gallon tank with combination filler, and breather cap. It is attached to the frame and is located under the hinged doors on the auxiliary control station side of the machine.

b. Removal.

(1) Disconnect all hydraulic lines and remove hydraulic filter.

(2) Remove plug (1) and drain tank. Remove elbow (2), nipple (3), and elbow (4).

(3) Remove nut (5), lockwasher (6), and remove tank mounting strap (7) and webbing (8). Remove tank (9) from the paving machine.

c. Disassembly.

(1) Remove screw (10), lockwasher (11), inlet and out pipe (12), and gasket (13) from tank.

(2) Remove screw (14), lockwasher (15), cover plate (16), and gasket (17) from tank.

(3) Remove screw (18), cap (19), and gasket (20), from tank. Remove screw (21), washer (22), adapter plate (23), and gasket (24) from hydraulic tank. Remove drain cock (25) from tank.

d. Cleaning, Inspection and Repair.

(1) Thoroughly flush hydraulic tank with solvent to remove dirt or other sediments.

(2) Inspect tank for bad dents, cracks, and leaks. Replace a damaged tank.

(3) Inspect for damaged or worn threads in openings. Repair damaged threads by chasing if practical, otherwise replace the tank.

KEY for figure 3-55.

1. Plug
2. Elbow
3. Nipple
4. Elbow
5. Nut
6. Lockwasher
7. Strap
8. Webbing
9. Tank
10. Screw
11. Lockwasher
12. Inlet and outlet pipe
13. Gasket
14. Screw
15. Lockwasher
16. Cover plate
17. Gasket
18. Screw
19. Cap
20. Gasket
21. Screw
22. Washer
23. Adapter plate
24. Gasket
25. Drain cock

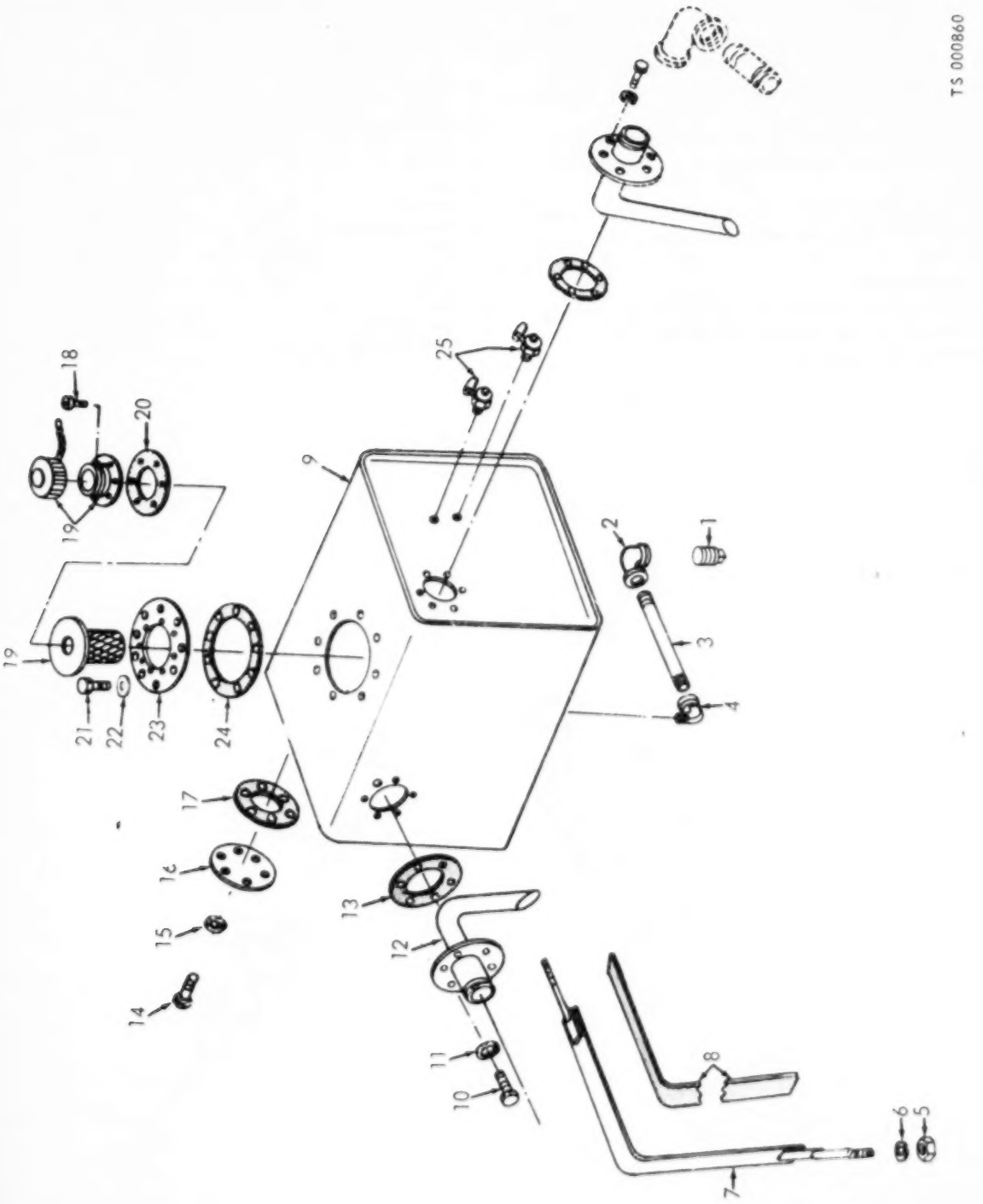


Figure 3-55. Hydraulic tank.

(4) Clean fill cap and strainer with solvent and dry with compressed air. Replace a damaged strainer and cap.

e. Reassembly.

(1) Install drain cock (25) in hydraulic tank (9). Install gasket (24), adapter plate (23), on tank and secure with washer (22), and screw (21). Install gasket (20), cap (19) on tank and secure with screw (18).

(2) Install gasket (17) and cover plate (16) on tank and secure with lockwasher (15) and screw (14).

(3) Install gasket (13), inlet and outlet pipe (12), on tank and secure with lockwasher (11), and screw (10).

f. Installation.

(1) Position hydraulic tank (9) on paving machine and secure with webbing (8), strap (7), lockwasher (6), and nut (5).

(2) Install elbow (4), nipple (3), elbow (2), and plug (1).

(3) Install hydraulic filter and connect hydraulic lines. Add hydraulic oil to the hydraulic tank.

KEY for figure 3-5b.

1. Cap nut
2. Gasket
3. Adjusting screw
4. Screw
5. Washer
6. Seat
7. Spring
8. Piston assembly
9. Cap
10. Cup
11. Spring
12. Shim
13. Seal assembly
14. Shaft assembly
15. Plug
16. Plug assembly
17. Washer
18. Retainer
19. Washer
20. Sleeve
21. Plug
22. Plug
23. Screw
24. Gasket
25. Cover
26. Gasket
27. Strainer
28. Wafer

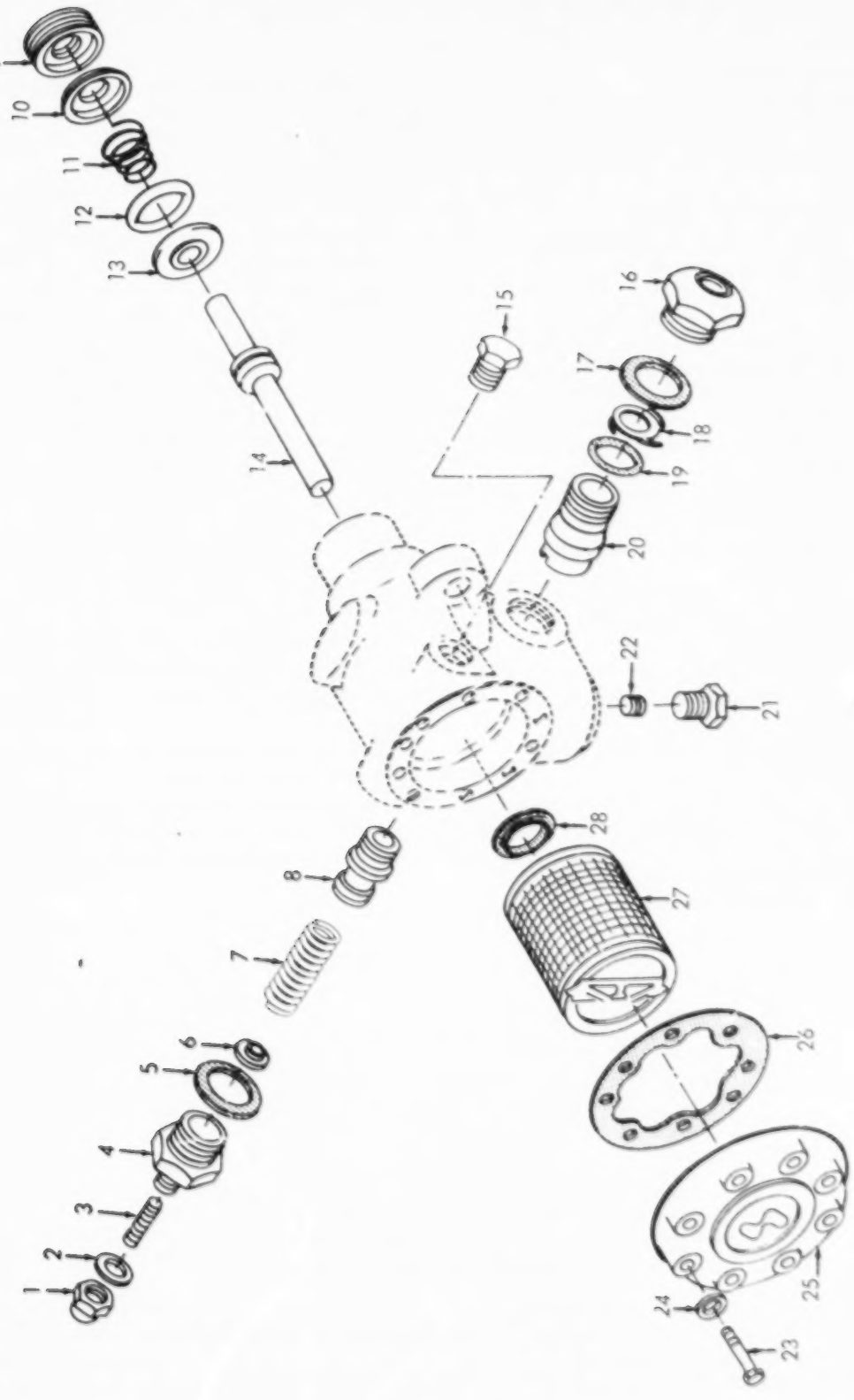


Figure 3-56. Burner fuel pump.

Section VIII. SCREED HEATING SYSTEM

3-35. Screed Heating System

The heating system consists of a fuel pump, blower, burners, combustion chamber, hot air chambers, and necessary pipe and connections to make up fuel lines.

3-36. Burner Fuel Pump (Fig. 3-56)

a. Removal. Refer to TM 5-3895-275-12, paragraph 4-92 and remove the fuel pump.

b. Disassembly.

(1) Remove cap nut (1), gasket (2), and adjusting screw (3). Remove screw (4), washer (5), seat (6), spring (7), and piston assembly (8) from pump housing.

(2) Remove cap (9), cup (10), spring (11), shim (12), seal assembly (13), and shaft assembly (14) from pump body.

(3) Remove plug (15), plug assembly (16), washer (17), retainer (18), washer (19), and sleeve (20), from pump body. Remove plugs (21 and 22), from pump body.

(4) Remove screw (23), gasket (24), cover (25), gasket (26), strainer (27), and wafer (28), from pump body.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect pump body and cover for cracks, breaks, or other damage.

(3) Inspect shaft, piston, sleeve, and pump body bore for nicks, burs, or signs of excessive wear.

(4) Inspect pressure spring and seal springs for cracks, breaks, or signs of weakness.

(5) Replace defective parts as necessary. Always use new seals and gaskets when rebuilding pump.

d. Reassembly.

(1) Install wafer (28), strainer (27), gasket (26), and cover (25) on pump. Secure cover to pump with gasket (24) and screw (23).

(2) Install plugs (22 and 21) in pump body. Install sleeve (20), washer (19), retainer (18), and washer (17) in pump body. Install plug assembly (16) and plug (15).

(3) Position shaft assembly (14) in pump body and install seal assembly (13), shim (12), spring (11), cup (10), and cap (9).

(4) Position piston assembly (8) in pump body and install spring (7), seat (6), washer (5), and screw (4). Install adjusting screw (3), nut (2), and cap nut (1).

e. Pressure Adjustment. After pump has been reassembled, and before installing on machine, adjust pump pressure relief valve to bypass at 140- to 145-PSI.

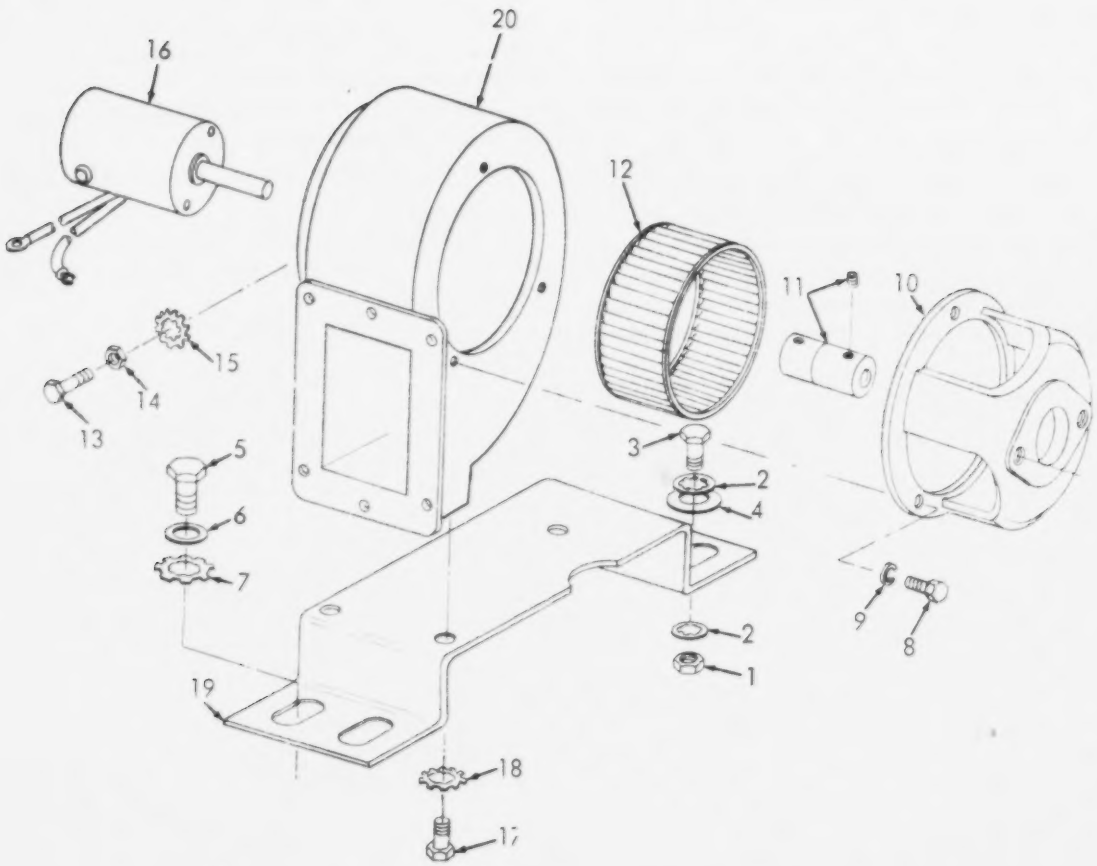
f. Installation. Refer to TM 5-3895-275-12, paragraph 4-92 and install the fuel pump.

3-37. Screed Blower (Fig. 3-57)

a. Removal.

(1) Refer to TM 5-3895-275-12, paragraph 4-93 and remove burner air lines.

(2) Remove nut (1), lockwasher (2), screw (3), flatwasher (4), screw (5), flatwasher (6), lockwasher (7), and remove screed blower and motor.



TS 000862

1. Nut
2. Lockwasher
3. Screw
4. Flatwasher
5. Screw
6. Flatwasher
7. Lockwasher
8. Bolt
9. Lockwasher
10. Fuel pump support
11. Coupling
12. Impeller
13. Screw
14. Nut
15. Lockwasher
16. Motor
17. Bolt
18. Lockwasher
19. Support
20. Housing

Figure 3-57. Screed blower

b. Disassembly.

(1) Remove bolt (8), lockwasher (9), and fuel pump support (10).

(2) Loosen fuel pump drive coupling set-screws and remove coupling (11) and blower impeller (12).

(3) Remove screw (13), nut (14), lockwasher (15), and fuel pump and blower drive motor (16).

(4) Remove bolt (17) and lockwasher (18), and remove blower support (19) from blower housing (20).

c. Reassembly.

(1) Position blower housing (20) on blower support (19) and secure with lockwasher (18) and bolt (11).

(2) Position fuel pump and blower drive motor (16) on blower housing and secure with lockwasher (15), nut (14), and screw (13).

(3) Install blower impeller (12) on motor shaft. Install coupling (11) and tighten setscrews.

(4) Position fuel pump support (10) on blower housing and secure with lockwasher (9) and bolt (8).

d. Installation.

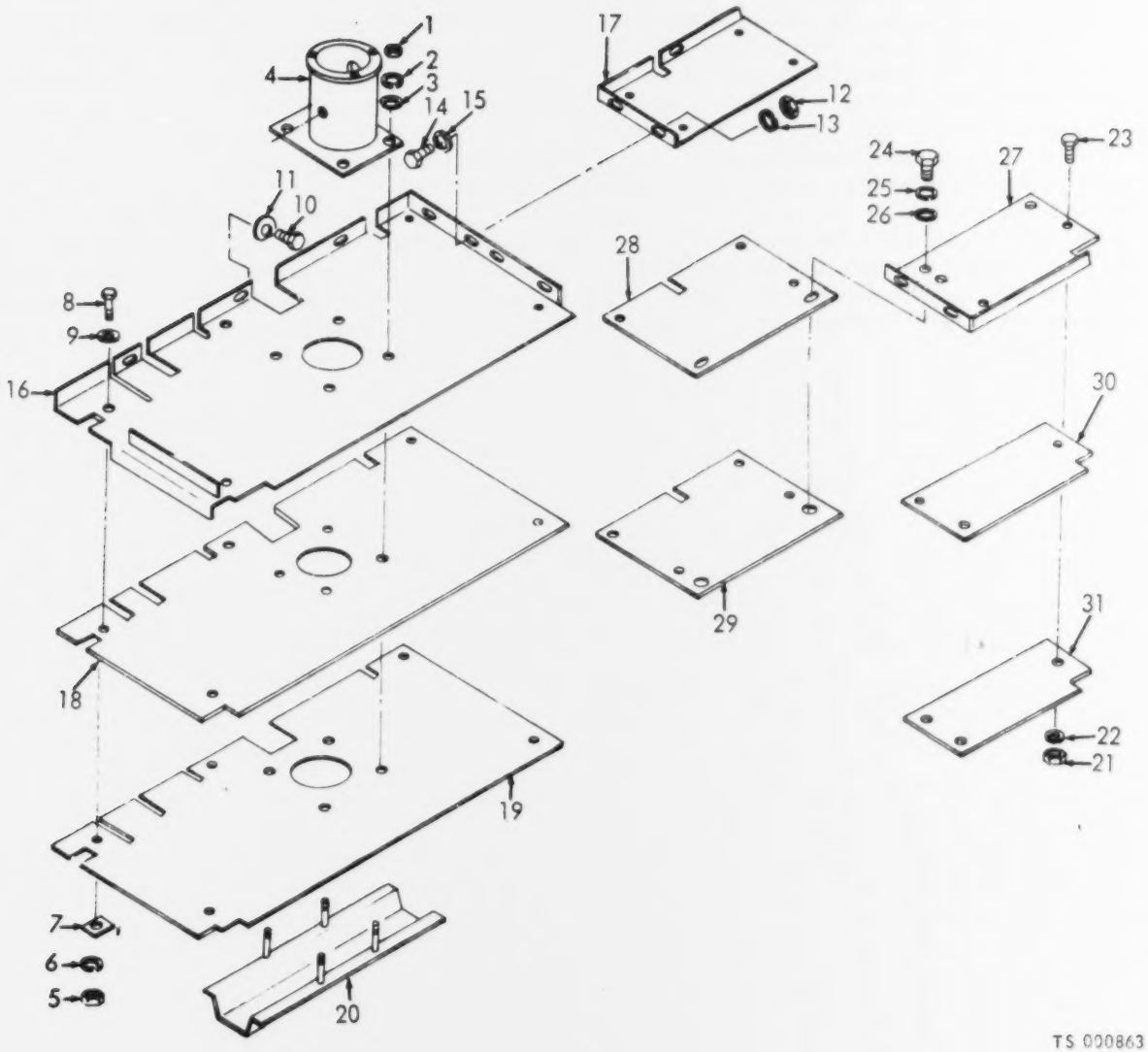
(1) Position screed blower and motor on screed unit and secure with lockwasher (7), flatwasher (6), screw (5), flatwasher (4), screw (3), lockwasher (2), and nut (1).

(2) Refer to TM 5-3895-275-12, paragraph 4-93 and install burner air lines.

3-38. Screed Burner Cover Plates (Fig. 3-58)

a. Removal.

(1) Remove nut (1), lockwasher (2), flatwasher (3), and combustion chamber (4) from screed plate.



TS 000863

1. Nut
2. Lockwasher
3. Flatwasher
4. Combustion chamber
5. Nut
6. Lockwasher
7. Clamp
8. Screw
9. Flatwasher
10. Screw
11. Flatwasher
12. Nut
13. Lockwasher
14. Screw
15. Flatwasher
16. Cover plate
17. Cover plate
18. Insulator
19. Heat cover
20. Deflector
21. Nut
22. Lockwasher
23. Bolt
24. Screw
25. Lockwasher
26. Flatwasher
27. Cover plate
28. Insulator
29. Heat cover
30. Insulator
31. Heat cover

Figure 3-58. Screed burner cover plates.

(2) Remove nut (5), lockwasher (6), clamp (7), screw (8), and flatwasher (9). Remove screw (10), flatwasher (11), nut (12), lockwasher (13), screw (14), and flatwasher (15).

(3) Remove cover plates (16 and 17), insulator (18), heat cover (19), and deflector (20).

(4) Remove nut (21), lockwasher (22), bolt (23), screw (24), lockwasher (25), and flatwasher (26). Remove cover plate (27), insulator (28), heat cover (29), insulator (30), and heat cover (31).

b. Cleaning, Inspection and Repair.

(1) Clean all parts with a cleaning solvent and dry thoroughly.

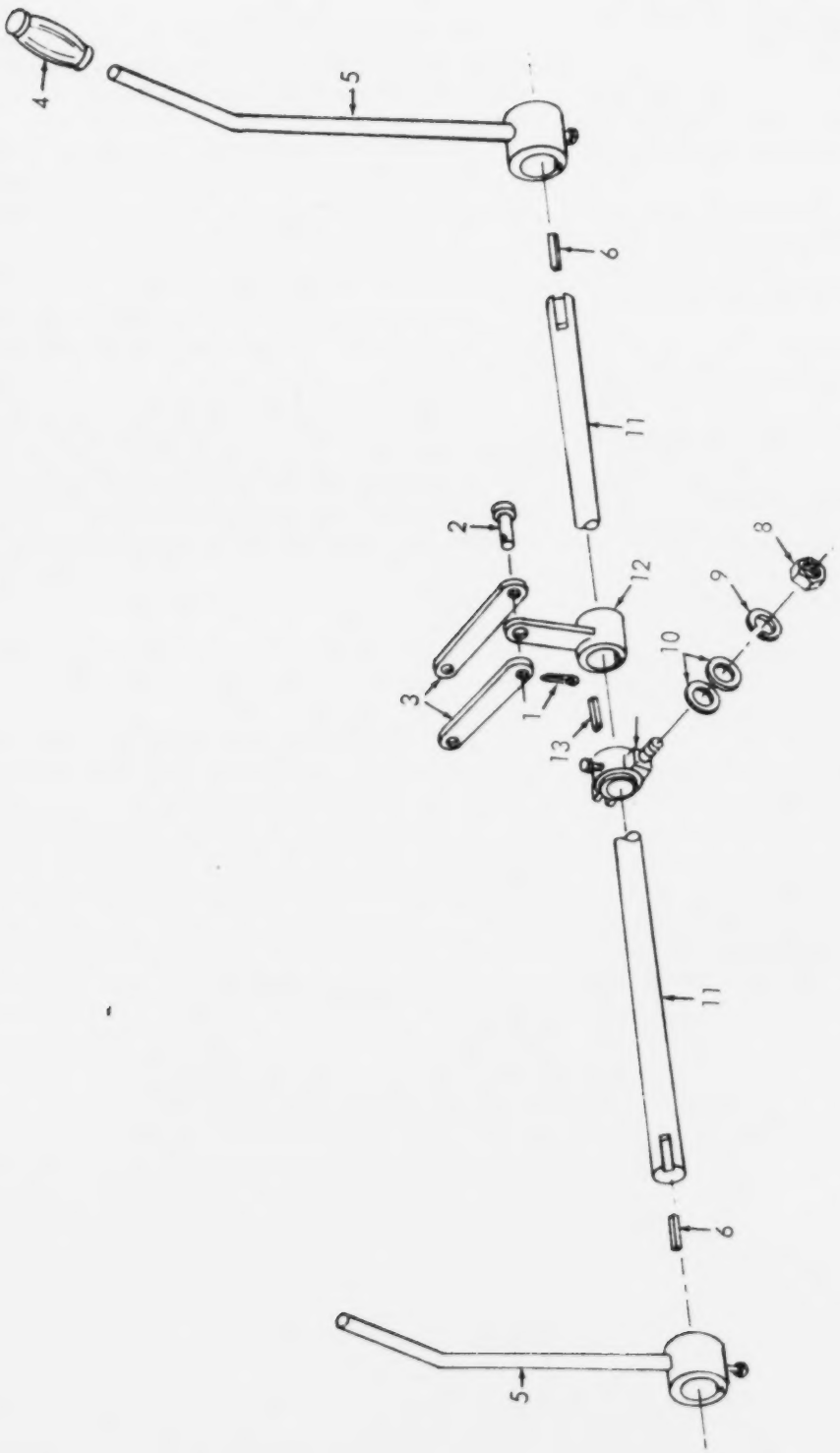
(2) Inspect all parts for general condition. Since the heating chambers are subject to direct flame and high temperatures, rust and deterioration is rapid. Replace parts as necessary.

c. Installation.

(1) Install heat cover (31), insulator (30), heat cover (29), and insulator (28) on cover plate (27). Secure those items to cover plate with flatwasher (26), lockwasher (25), screw (24), bolt (23), lockwasher (22), and nut (21).

(2) Install deflector (20), heat cover (19), and insulator (18) on cover plate (16). Secure those items to cover plate with screw (8), flatwasher (9), clamp (7), lockwasher (6), and nut (5). Install cover plate (17) on cover plate (16) and secure with flatwasher (15), screw (14), lockwasher (13), and nut (12).

(3) Install assembled cover plate (16) on screed unit and secure with flatwasher (11) and screw (10). Install combustion chamber (4) on cover plate, hold deflector (20) in position and install flatwasher (3) lockwasher (2), and nut (1).



1. Cotter pin
2. Pin
3. Link
4. Handle grip
5. Lever
6. Key
7. Nut
8. Lockwasher
9. Flatwasher
10. Bearing assembly
11. Shaft
12. Lever
13. Key

Figure 3-59. Tamper controls.

Section IX. MACHINERY CONTROLS

3-39. Tamper Controls (Fig. 3-59)

a. Removal.

(1) Remove cotter pin (1), pin (2), and link (3). Remove handle grip (4), loosen setscrew on tamper control lever and remove tamper control levers (5) and key (6).

(2) Remove nut (7), lockwasher (8), and flatwasher (9) from bearing assembly (10). Remove bearing assembly (10) from shaft (11).

(3) Remove lever (12) and key (13) from shaft (11).

b. Cleaning and Inspection.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect bearing assembly for excessive wear and general condition.

(3) Inspect levers and shaft for burs, cracks, or excessive wear.

(4) Replace parts as necessary.

c. Installation.

(1) Install key (13), and lever (12) on shaft (11).

(2) Install bearing assembly (10), on shaft and secure bearing assembly to paving machine frame with flatwasher (9), lockwasher (8), and nut (7).

(3) Install key (6), and levers (5), on shaft. Install handle grip (4) on handle control lever. Install link (3) and install pin (2) and cotter pin (1).

3-40. Steering Controls (Fig. 3-60)

a. Removal.

(1) Remove screw (1), lockwasher (2), flatwasher (3), and bracket (4). Remove spring (5), nuts (6), screw (7), and lock (8).

(2) Remove handle grips (9) from control levers. Remove nut (10), lockwasher (11), screw (12), and remove control levers (13, 14, 15, and 16).

(3) Remove nut (17), lockwasher (18), flatwasher (19), screw (20), nut (21), lockwasher (22), screw (23), and remove bearing bracket (24).

(4) Remove lubrication fitting (25), and flange bearing (26). Loosen collar setscrews and remove collar (27) and bracket (28).

(5) Remove pin (29), and remove lever (30) and bracket (31). Remove shaft (32) from cross shaft (33).

b. Cleaning and Inspection.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect flange bearings and shafts for excessive wear and general condition.

(3) Inspect levers and brackets for cracks or breaks.

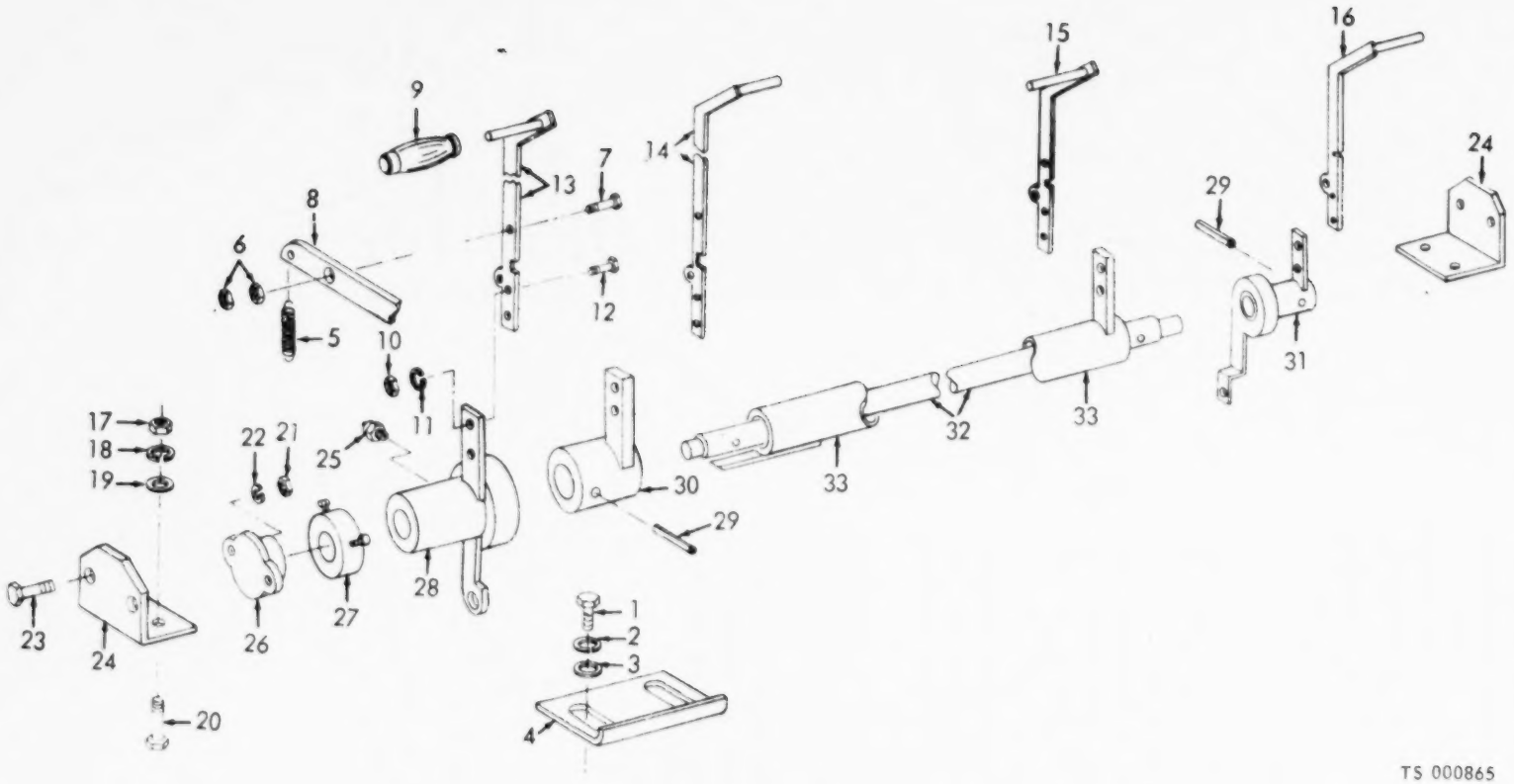
(4) Replace all defective parts.

c. Installation.

(1) Install shaft (32) in cross shaft (33). Install bracket (31) and lever (30) on shaft and secure with pin (29).

(2) Install bracket (28) and collar (27) and tighten setscrew on collar. Install bearing flange (26) and lubrication fitting (25).

(3) Install bearing bracket (24) and secure with screw (23), lockwasher (22), nut (21), screw (20), flatwasher (19), lockwasher (18), and nut (17).



1. Screw
2. Lockwasher
3. Flatwasher
4. Bracket
5. Spring
6. Nut
7. Screw
8. Lock
9. Grip
10. Nut
11. Lockwasher
12. Screw
13. Lever
14. Lever
15. Lever
16. Lever
17. Nut
18. Lockwasher
19. Flatwasher
20. Screw
21. Nut
22. Lockwasher
23. Screw
24. Bearing bracket
25. Lubrication fitting
26. Flange bearing
27. Collar
28. Bracket
29. Pin
30. Lever
31. Bracket
32. Shaft
33. Shaft

Figure 3-60. Steering controls.

(4) Position control levers (16, 15, 14, and 13) on levers and brackets and secure with screw (12), lockwasher (11), and nut (10). Install handle grips (9) on control levers.

(5) Install lock (8) on control lever and secure with screw (7) and nut (6). Install lock spring (6). Position bracket (4) on paving machine frame and secure with flatwasher (3), lockwasher (2), and screw (1).

3-41. Feeder Clutch Controls

a. Removal.

(1) Remove cotter pin (1), pin (2), and clutch release rod (3). Remove cotter pin (4), pin (5), nut (6), spacer (7), pivot pin (8), and rod (9).

(2) Remove pins (10 and 11), brake lever (12), lubrication fitting (13), and cam lever (14). Remove setscrew (15), lubrication fitting (16), cotter pin (17), pin (18), needle bearing (19), flatwasher (20), and clutch lever (21).

(3) Remove cotter pin (22), pin (23), nut (24), lockwasher (25), flatwasher (26), screw (27), and link (28). Remove cotter pins (29), pins (30), and links (31).

(4) Remove collar (32) and loosen setscrews on levers and drive out shaft (33). Remove key (34), lever (35), flange bearing (36), key (37), and lever (38).

(5) Remove nut (39), lockwasher (40), screw (41), and clutch pedals (42 and 43). Remove nut (44), setscrew (45), nut (46), lockwasher (47), screw (48), and flange bearing (49).

KEY for figure 3-61.

1. Cotter pin
2. Pin
3. Rod
4. Cotter pin
5. Pin
6. Nut
7. Spacer
8. Pivot pin
9. Rod
10. Pin
11. Pin
12. Lever
13. Lubrication fitting
14. Lever
15. Setscrew
16. Lubrication fitting
17. Cotter pin
18. Pin
19. Needle bearing
20. Flatwasher
21. Clutch lever
22. Cotter pin
23. Pin
24. Nut
25. Lockwasher
26. Flatwasher
27. Screw
28. Link
29. Cotter pin
30. Pin
31. Link
32. Collar
33. Shaft
34. Key
35. Lever
36. Flange bearing
37. Key
38. Lever
39. Nut
40. Lockwasher
41. Screw
42. Clutch pedal
43. Clutch pedal
44. Nut
45. Setscrew
46. Nut
47. Lockwasher
48. Screw
49. Flange bearing
50. Cotter pin
51. Pin
52. Link
53. Shaft
54. Pedal support
55. Spacer
56. Pedal support
57. Key
58. Pivot
59. Collar
60. Screw
61. Lockwasher
62. Lockout
63. Lever
64. Key

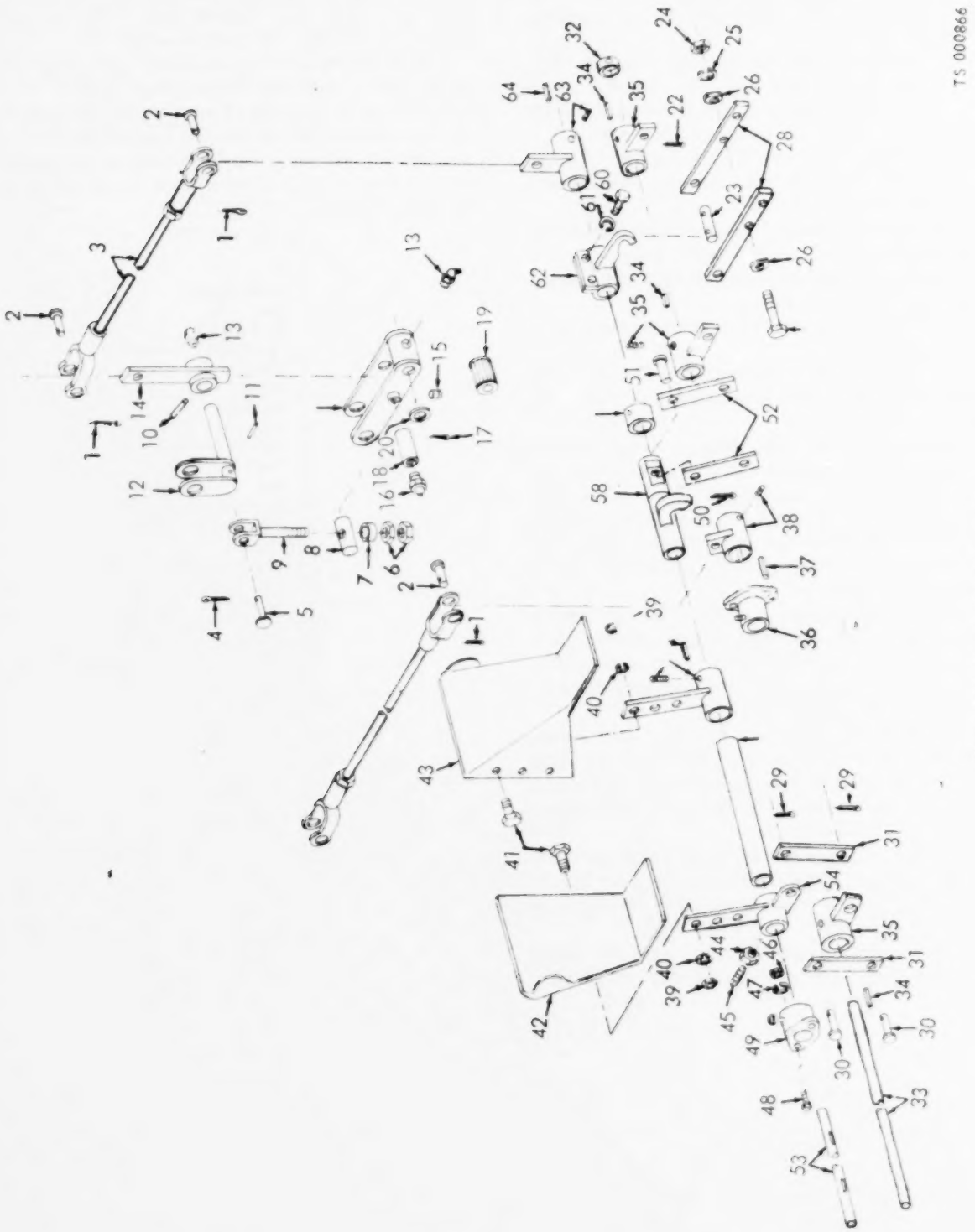


Figure 3-61. Feeder clutch controls

(6) Remove cotter pin (50), pin (51), and link (52). Loosen setscrews on levers, collars and drive out shaft (53).

(7) Remove pedal support (54), spacer (55), pedal support (56), and key (57). Remove pivot (58), collar (59), screw (60), lockwasher (61), lockout (62), lever (63), and key (64).

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect flange bearings and shafts for excessive wear and general condition.

(3) Inspect rod ends and levers for cracks, breaks, or excessive wear.

(4) Replace all defective parts as necessary.

c. Installation.

(1) Install flange bearing (49) on frame and secure with screw (48), lockwasher (47), and nut (46).

(2) Install shaft (46), through flange bearing and install pedal support (54), spacer (55), key (57), pedal support spacer (56), and pivot (58). Install collar (59), lockout (62), key (64), and lever (63). Secure lockout (62) to shaft with screw (60) and lockwasher (61). Tighten setscrews on all levers and collars.

(3) Install flange bearing (36) on frame. Install shaft (33) through flange bearing and install key (37) and lever (38). Install key (34), lever (35), and collar (32). Tighten setscrews on all levers and collars.

(4) Position links (31) on lever and secure with pin (30) and cotter pin (29). Position links (28) on lever and secure with pin (23) and cotter pin (22). Install screw (27), flatwasher (26), lockwasher (25), and nut (24).

(5) Install setscrew (45) in pedal support and install nut (44). Position pedals (43 and 42) on levers and secure with screw (41), lockwasher (40), and nut (39).

(6) Position needle bearing (19) in clutch lever and install flatwasher (20) and clutch lever (21) on clutch assembly. Secure lever to clutch with pin (18) and cotter pin (17). Install lubrication fitting (16) and setscrew (15).

(7) Position lever (14) on clutch assembly and install lever (12) and lubrication fitting (13). Install pins (11 and 10). Position pivot pin (8) in clutch lever and install rod (9). Install spacer (7), and nuts (6) on rod. Install pin (5) and cotter pin (4). Position rods (3) on levers and secure with pin (2) and cotter pin (1).

KEY for figure 3-62.

1. Pin
2. Drive head
3. Nut
4. Lockwasher
5. Flatwasher
6. Screw
7. Screw
8. Retainer
9. Support
10. Gate screw
11. Nut
12. Nut
13. Lockwasher
14. Flatwasher
15. Screw
16. Extension plate
17. Nut
18. Lockwasher
19. Screw
20. Gate bracket
21. Gate
22. Gate screw
23. Bushing
24. Cotter pin
25. Flatwasher
26. Pin
27. Pivot pin
28. Gate lever
29. Cotter pin
30. Pin
31. Nut
32. Lockwasher
33. Bolt
34. Keeper
35. Spacer
36. Toggle link
37. Gate

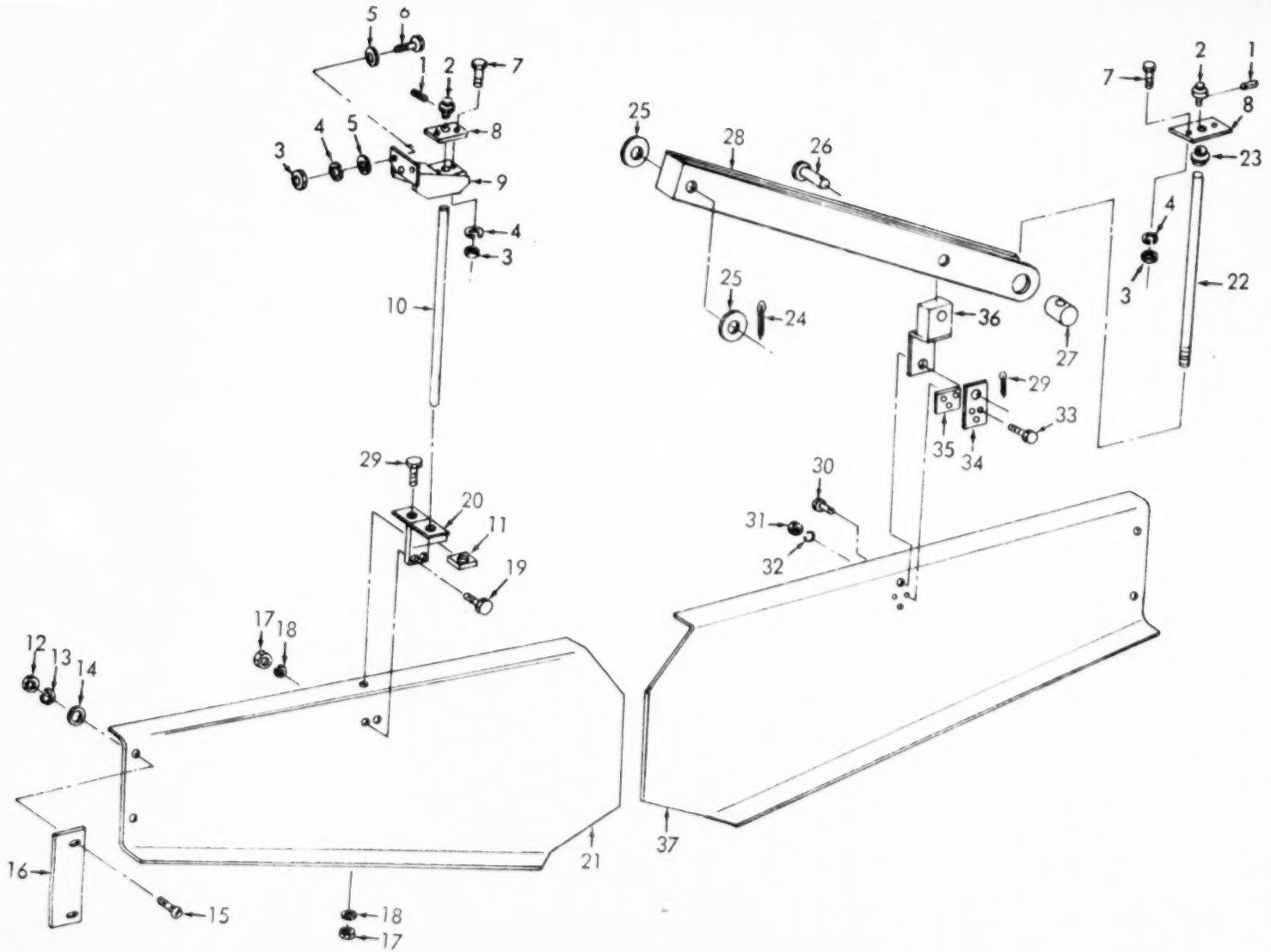


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Figure 3-62. Feeder control gates.

Section X. HOPPER AND SCREW FEEDER CONVEYOR

3-42. Feeder Control Gates (Fig. 3-62)

a. Removal.

(1) Remove pin (1) and drive head (2). Remove nut (3), lockwasher (4), flatwasher (5), screw (6 and 7), retainer (8), and support (9).

(2) Remove gate screw (10) and nut (11). Remove nut (12), lockwasher (13), flatwasher (14), screw (15), and extension plate (16). Remove nuts (17), lockwashers (18), screws (19), and gate bracket (20). Remove gate (21) from the paving machine.

(3) Remove gate screw (22) and bushing (23). Remove cotter pin (24), flatwasher (25), pin (26), pivot pin (27), and gate lever (28).

(4) Remove cotter pin (29), pin (30), nut (31), lockwasher (32), bolt (33), keeper (34), spacers (35), and toggle link (36), from gate (37). Remove gate (37) from the paving machine.

b. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect all mounting hardware and brackets for cracks, breaks, or damaged threads.

(3) Inspect gates for distortion, warpage, or general condition.

(4) Replace parts as necessary.

c. Installation.

(1) Position toggle link (36) on gate (37) and install spacer (35) and keeper (34). Secure keeper to gate with bolt (33), lockwasher (32), and nut (31). Install pin (30) and cotter pin (29).

(2) Install assembled gate (37) in paving machine and install gate lever (28). Install pivot pin (27), pin (26), flatwasher (25), and cotter pin (24). Install bushing (23) and gate screw (22).

(3) Position gate bracket (20) on gate (21) and secure with screw (19), lockwasher (18), and nut (17). Install assembled gate (21) in paving machine and install extension plate (16). Secure extension to gate with screw (15), flatwasher (14), lockwasher (13), and nut (12).

(4) Position nut (11) under gate bracket and install gate screw (10). Position support (9) and retainer (8) on paving machine and secure with screws (7 and 6), flatwasher (5), lockwasher (4), and nut (3).

d. Adjustment. Refer to TM 5-3895-275-12, paragraph 2-8, for gate adjustment.

3-43. Hopper Frame and Components (Fig. 3-63)

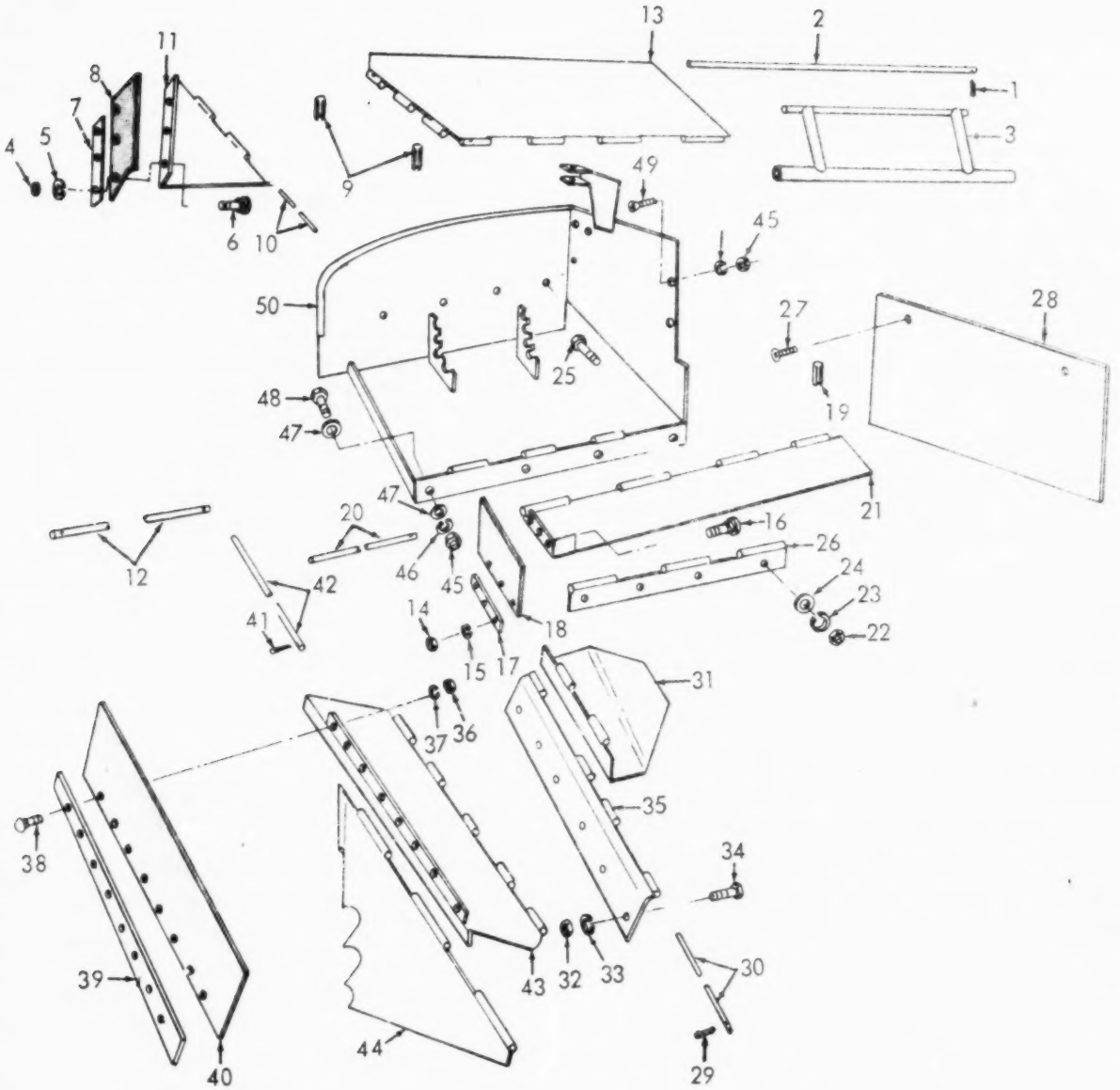
a. Removal.

(1) Remove cotter pin (1), hinge pin (2), and support (3). Remove nut (4), lockwasher (5), bolt (6), support (7), and shield (8). Remove spring pins (9), hinge pin (10), and deflector (11).

(2) Remove hinge pin (12) and hopper base (13). Remove nut (14), lockwasher (15), bolt (16), support (17), and shield (18). Remove spring pin (19), hinge pin (20), and hopper base (21). Remove nut (22), lockwasher (23), flatwasher (24), screw (25), and hinge (26).

(3) Remove screw (27), and frame plate (28). Remove cotter pin (29), hinge pin (30), and apron (31). Remove nut (32), lockwasher (33), screw (34), and apron bracket (35).

(4) Remove nut (36), lockwasher (37), bolt (38), support (39), and shield (40). Remove cotter pin (41), hinge pin (42), apron (43), and plate (44).



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1. Cotter pin	11. Deflector	21. Hopper base	31. Apron	41. Cotter pin
2. Hinge pin	12. Hinge pin	22. Nut	32. Nut	42. Hinge pin
3. Support	13. Hopper base	23. Lockwasher	33. Lockwasher	43. Apron
4. Nut	14. Nut	24. Flatwasher	34. Screw	44. Plate
5. Lockwasher	15. Lockwasher	25. Screw	35. Apron bracket	45. Nut
6. Bolt	16. Bolt	26. Hinge	36. Nut	46. Lockwasher
7. Support	17. Support	27. Screw	37. Lockwasher	47. Flatwasher
8. Shield	18. Shield	28. Frame plate	38. Bolt	48. Screw
9. Spring pin	19. Spring pin	29. Cotter pin	39. Support	49. Screw
10. Hinge pin	20. Hinge pin	30. Hinge pin	40. Shield	50. Hopper frame

Figure 3-63. Hopper frame and components

(5) Remove nuts (45), lockwashers (46), flatwashers (47), screws (48 and 49), and remove hopper frame (50) from the paving machine.

(6) Follow steps (1 thru 5) to remove right hand hopper frame and components.

b. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect shields, deflectors, supports, and aprons for cracks, breaks, distortion, and warpage.

(3) Inspect all mounting hardware for breaks or damaged threads.

(4) Replace damaged parts as necessary.

c. Installation.

(1) Install hopper frame (50) on the paving machine and secure with screws (49 and 48), flatwashers (47), lockwashers (46), and nuts (45).

(2) Install plate (44) and apron (43) on hopper frame and install hinge pin (42) and cotter pin (41). Install shield (40) and support (39) on apron and secure with bolt (38), lockwasher (37), and nut (36).

(3) Install apron bracket (35) on hopper frame and secure with screws (34), lockwashers (33), and nuts (32). Install apron (31) on apron bracket and secure with hinge pin (30) and cotter pin (29). Install frame plate (28) on paving machine and secure with screw (27).

(4) Install hinge (26) on hopper frame and secure with screws (25), flatwashers (24), lockwashers (23), and nuts (22). Install hopper base (21) on hopper frame and secure with hinge pin (20) and spring pin (19). Install shield (18), and support (17), on hopper base and secure with bolts (16), lockwashers (15), and nuts (14). Install hopper base (13) and secure with hinge pin (12).

(5) Install deflector (11) on hopper base and secure with hinge pin (10), and spring pins (9). Install shield (8) and support (7) on deflector and secure with bolts (6), lockwashers (5), and nuts (4). Install support (3) on hopper frame and secure with hinge pin (2) and cotter pin (1).

(6) Follow steps (1 thru 5) to install right hand hopper frame and components.

3-44. Hopper Bar Feeder and Chain Assembly (Fig. 3-64)

a. General. The hopper bar feeder and chain assembly is a special block link chain, with bar steel flights which are forged at the ends to fit into the cored opening of the block link every 11 inches. Every other flight bar is drilled for a cotter pin. The chain links are coupled together with lock pins so that the chain may be uncoupled at any point in its length.

b. Removal.

(1) Remove screed unit and run machine up on blocks to obtain working clearance.

(2) Release screws on take-up foot shaft and uncouple chain and bars over the head shaft and remove chain and bar assembly (1) from hopper.

c. Disassembly.

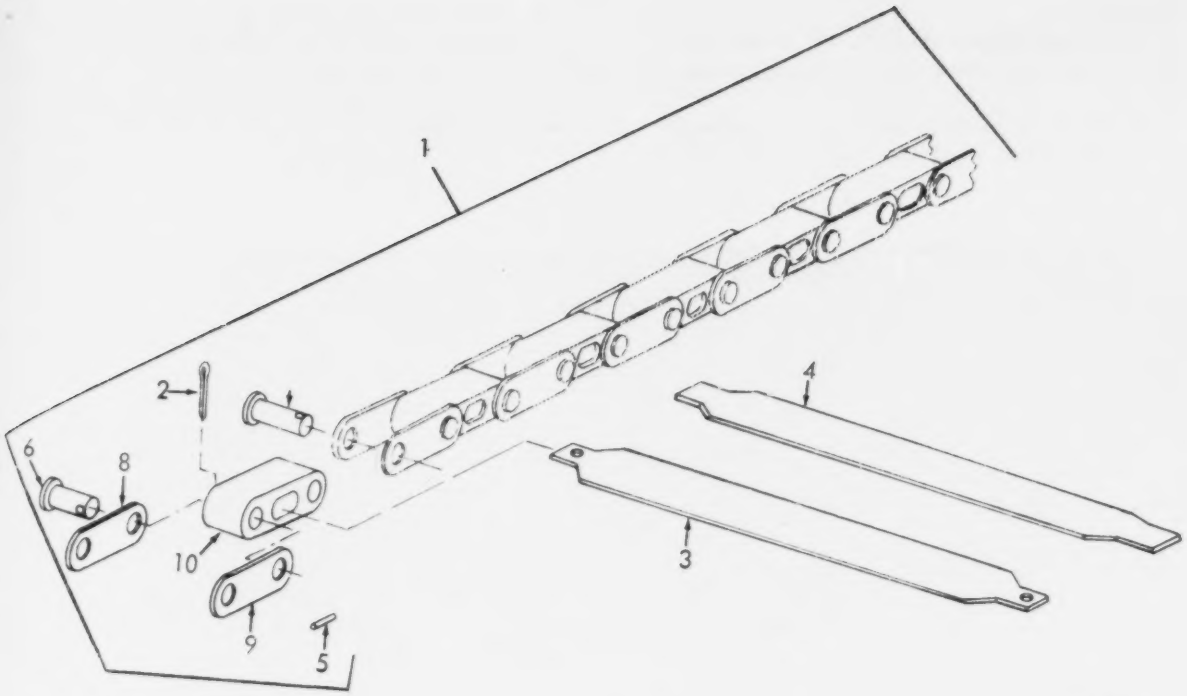
(1) Remove cotter pin (2), flight bar (3), and flight bar (4).

(2) Use an acetylene torch and burn off ends of lock pins (5). Remove coupler pins (6 and 7), plates (8 and 9), and link block (10).

d. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect all block links, coupler pins, and plates for cracks, breaks, or excessive wear.



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1. Chain and bar assembly
2. Cotter pin
3. Flight bar
4. Flight bar
5. Lock pins
6. Coupler pin
7. Coupler pin
8. Plate
9. Plate
10. Link block

Figure 3-64. Hopper bar feeder chain assembly.

(3) Inspect flight bars for cracks, breaks, distortion, or excessive wear.

(4) Replace defective parts as necessary.

e. Reassembly.

(1) Install link block (10), plates (9 and 8), and coupler pins (7 and 5). Install lock pins (5) and bend end of pins.

(2) Install flight bars (4 and 3) and install cotter pins (2).

f. Installation.

(1) Fasten a rope or similar device to one end of the chain and bar assembly (1), and pull rope through under hopper drag pan of main frame.

(2) With a suitable lifting device suspend the chain and bar assembly over the front end of the hopper so it can be fed down over the foot shaft and on to the tracks for the lower run.

NOTE

When installing chain and bar assembly be sure they are installed so the direction of the chain travel of the foot and head shaft is as shown in figure 3-64. If chain and bar assembly are not installed properly, the keeper pins will interfere with the flight bars and be broken.

(3) Pull lower run of chain and bar assembly through to the head shaft. Lower to run into hopper and work back through to head shaft and connect chains.

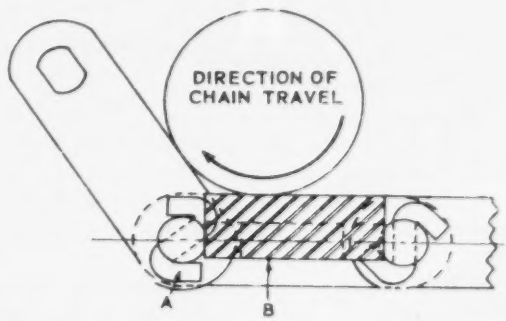

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Figure 3-65. Hopper feeder chain and bar assembly direction of travel.

g. Adjustment.

(1) Lift front hopper plate (1, fig. 3-66) and prop it open to provide access to the adjusting screws.

(2) Loosen locknut (2) on the center adjusting screws and straighten locking plate on the outboard screws.

(3) Adjust both adjusting screws (3) evenly.

(4) Tighten locknut (2) and bend edge of locking plate over locknuts.

(5) Repeat the same procedure for the other bar feeder chains.

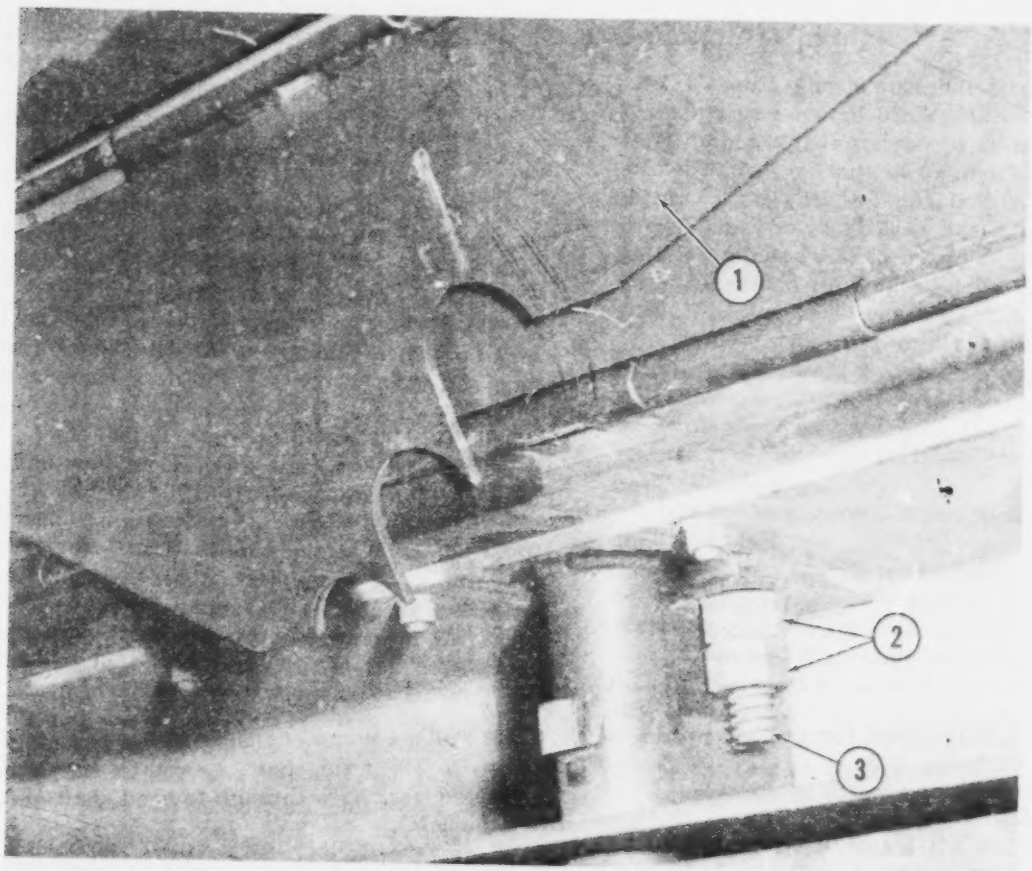

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Figure 3-66. Hopper chain and bar assembly adjustment.

3-45. Feeder Pan (Fig. 3-67)

a. Removal.

(1) Remove nut (1), lockwasher (2), flatwasher (3), screw (4), pan (5), and shim (6).

(2) Remove nut (7), lockwasher (8), flatwasher (9), screw (10), and wearing bars (11 and 12).

(3) Remove nut (13), lockwasher (14), screw (15), flatwasher (16), and side guards (17 and 18).

(4) Remove nut (19), lockwasher (20), flatwasher (21), screw (22), and outer guard (23).

(5) Remove nut (24), lockwasher (25), flatwasher (26), screw (27), and drag pans (28 and 29).

KEY for figure 3-67.

1. Nut
2. Lockwasher
3. Flatwasher
4. Screw
5. Pan
6. Shim
7. Nut
8. Lockwasher
9. Flatwasher
10. Screw
11. Wearing bars
12. Wearing bars
13. Nut
14. Lockwasher
15. Screws
16. Flatwasher
17. Side guards
18. Side guards
19. Nut
20. Lockwasher
21. Flatwasher
22. Screw
23. Outer guard
24. Nut
25. Lockwasher
26. Flatwasher
27. Screw
28. Drag pan
29. Drag pan

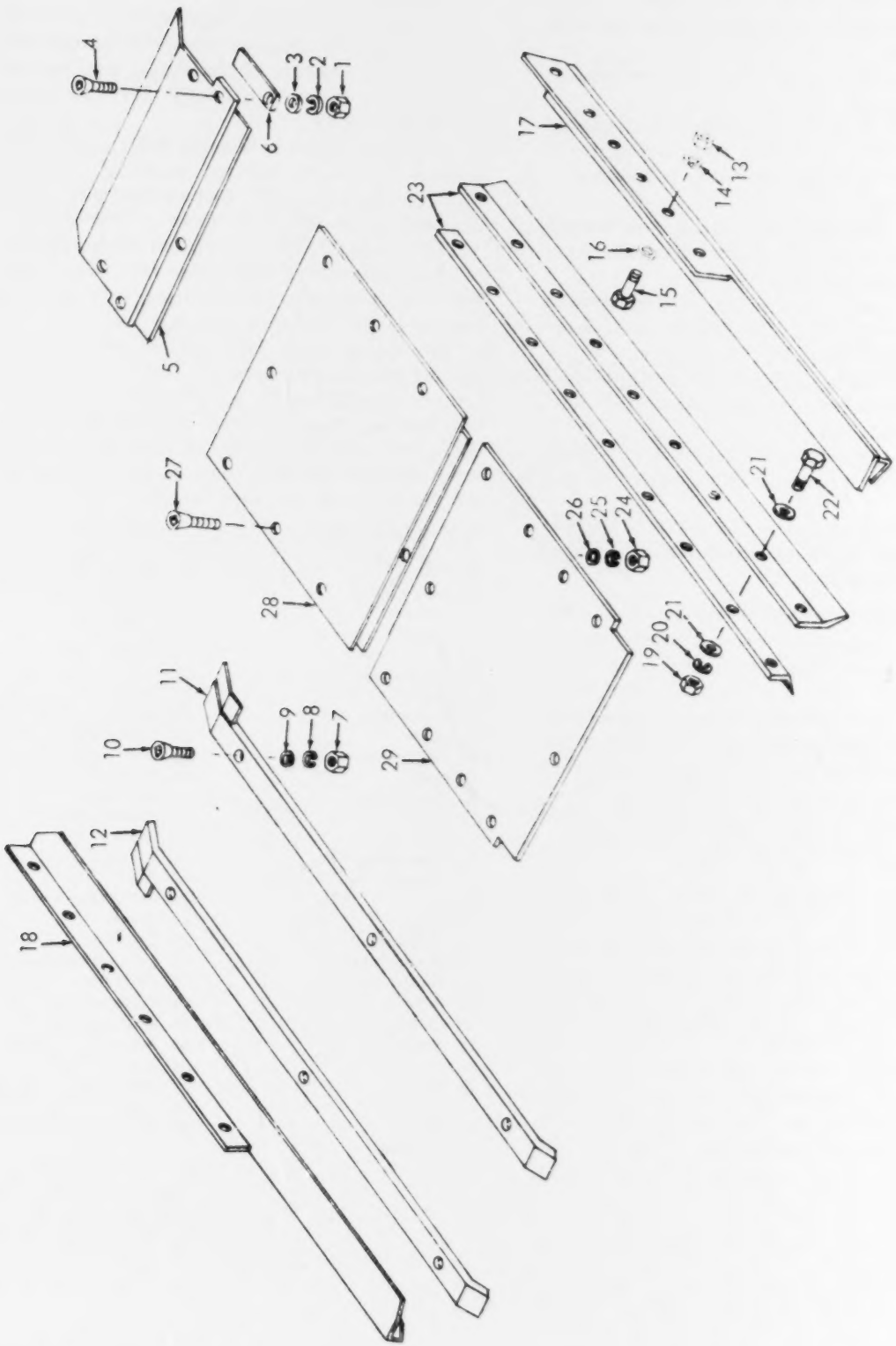


Figure 3-67. Feeder pan.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect all mounting hardware for cracks, breaks, or damaged threads.

(3) Inspect pans, wearing bars, and guards for cracks, breaks, distortion and warpage.

(4) Replace damaged parts as necessary.

c. Installation.

(1) Install drag pans (29 and 28) in hopper and secure with screw (27), flatwasher (26), lockwasher (25), and nuts (24).

(2) Install outer guard (23) in hopper and secure with screw (22), flatwasher (21), lockwasher (20), and nuts (19).

(3) Install side guards (18 and 17) in hopper and secure with screw (15), flatwasher (16), lockwasher (14), and nut (13).

(4) Install wearing bars (12 and 11) in hopper and secure with screw (10), flatwasher (8) and nuts (7).

(5) Install shim (6), and pan (5) in hopper. Secure pan with screw (4), flatwasher (3), lockwasher (2), and nut (1).

3-46. Screw Conveyor Shaft Assembly (Fig. 3-68)

a. General. The screw conveyors are made up of one right hand assembly and one left hand, each mounted on the right and left hand side of the machine, to operate independently, for spreading material received from the bar feeder across the width of the machine in front of the tamper. The screw conveyors are chain driven from the feeder and screw conveyor counter shaft which is chain driven by the feeder and screw drive clutch.

b. Removal.

(1) Refer to paragraph 3-23 and remove the leveling arms.

(2) Use a suitable lifting device and move screed unit away from the paving machine.

(3) Remove bolt (1), lockwashers (2), support (3), screw (4), and cover plate (5). Uncouple and remove screw drive chain (6).

(4) Attach a suitable lifting device to the screw conveyor assembly. Remove nut (7), lockwasher (8), screw (9), and flatwasher (10). Remove nut (11), lockwasher (12), screw (13), and remove screw conveyor assembly from the paving machine.

c. Disassembly.

(1) Remove nut (14), lockwasher (15), screw (16), and cap (17). Remove screw (18), lockwasher (19), bearing hangers (20 and 21), and bearing (22). Remove lubrication fitting (23), and nipple (24) from bearing.

(2) Remove outer bushing (25), screw (26), bushing (27), screw (28), and bushing (29) from shaft. Remove nut (30), lockwasher (31), screw (32), and screw (33) from shaft.

(3) Remove screws (34, 35 and 36) from shaft. Remove screw (37), lockwasher (38), wear plate (39), wear plate (40), and bearing (41). Remove bearing insert (42) from bearing.

(4) Drive shaft (43) out of center screw support and remove sprocket (44) and key (45). Remove lubrication fitting (46), and nipple (47) from bearing. Remove cotter pin (48), lubrication fitting (49), and drive pivot pin (50) out of center screw support. Remove chain screw take-ups (51 and 52) from center screw support.

KEY for figure 3-68.

1. Bolt
2. Lockwasher
3. Support
4. Screw
5. Cover plate
6. Drive chain
7. Nut
8. Lockwasher
9. Screw
10. Flatwasher
11. Nut
12. Lockwasher
13. Screw
14. Nut
15. Lockwasher
16. Screw
17. Cap
18. Screw
19. Lockwasher
20. Bearing hanger
21. Bearing hanger
22. Bearing
23. Lubrication fitting
24. Nipple
25. Bushing
26. Screw
27. Bushing
28. Screw
29. Bushing
30. Nut
31. Lockwasher
32. Screw
33. Screw
34. Screw
35. Screw
36. Screw
37. Screw
38. Lockwasher
39. Wear plate
40. Wear plate
41. Bearing
42. Bearing insert
43. Shaft
44. Sprocket
45. Key
46. Lubrication fitting
47. Nipple
48. Cotter pin
49. Lubrication fitting
50. Pivot pin
51. Chain take-up
52. Chain take-up
53. Setscrew
54. Nut
55. Setscrew
56. Nut
57. Screw center support

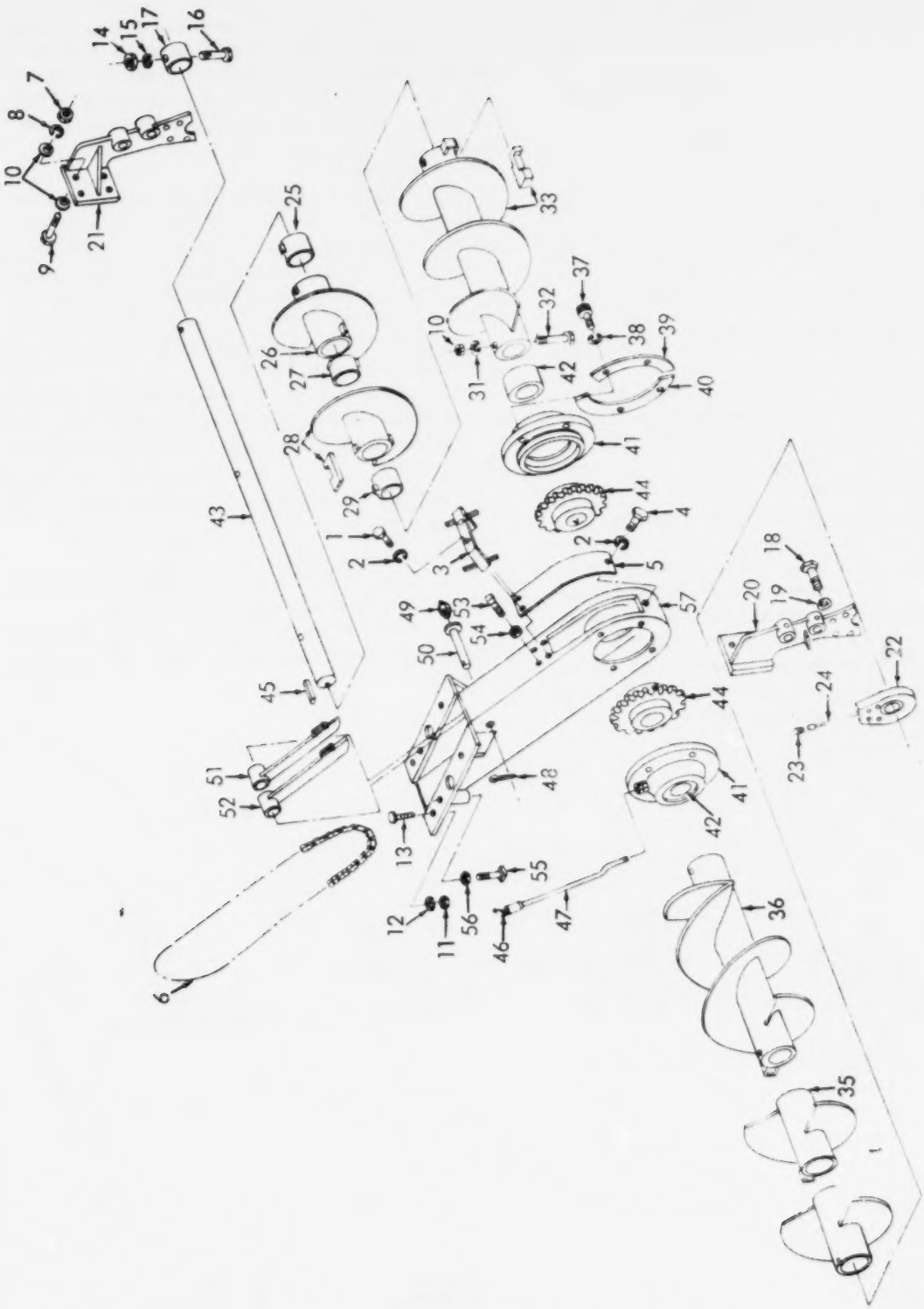


Figure 3-68. Screw conveyor shaft assembly.

(5) Remove setscrew (53), nut (54), setscrew (55), and nut (56), from screw center support (57).

d. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect shaft for cracks, breaks, scoring, or excessive wear.

(3) Inspect sprockets and chains for cracks, breaks, or excessive wear.

(4) Inspect bearings for scoring, excessive wear, or other damage.

(5) Inspect screws for cracks, breaks, or warpage.

(6) Replace defective parts as necessary.

e. Reassembly.

(1) Install setscrews (55 and 53) and nuts (56 and 54) in center screw support.

(2) Install screw take-ups (52 and 51) in center screw support and secure with pivot pin (50) and cotter pin (48). Install lubrication fitting (49) in pivot pin. Install nipple (47) and lubrication fitting (46) in bearing. Position sprockets (44) in center screw support and install key (45) and shaft (43).

(3) Install bearing insert (42) in bearing (41). Install bearing (41) on screw center support and secure with wear plates (40 and 39), lockwasher (38), and screws (37). Install screws (36, 35 and 34) on shaft. Secure screw (36) to shaft with screw (32), lockwasher (31), and nut (30).

(4) Install bushing (29), screw (28), and bushing (27), screw (26), and bushing (25) on shaft.

(5) Install nipple (24) and lubrication fitting (23) on bearing (22). Install bearing (22) and bearing hangers (21 and 20) on shaft and secure with lockwasher (19) and screw (18). Install cap (17), on shaft and secure with screw (16), lockwasher (15), and nut (14).

f. Installation.

(1) Attach a suitable lifting device to the screw conveyor assembly and position it on the paving machine. Secure the screw conveyor assembly to the paving machine with flatwasher (10), screw (9), lockwasher (8), and nut (7). Install and couple screw drive chain (6). Install cover plate (5) and secure with screw (4), support (3), lockwasher (2), and bolt (1).

(2) Use a suitable lifting device and install the screed unit on the paving machine.

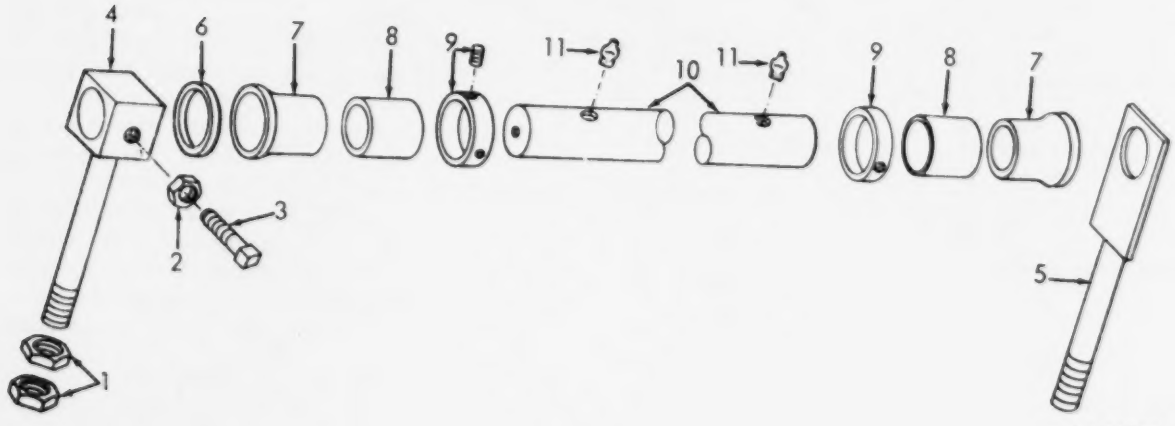
(3) Refer to paragraph 3-23 and install the leveling arms.

3-47. Hopper Feeder Foot Shaft Assembly (Fig. 3-69)

a. Removal.

(1) Refer to paragraph 3-44 and remove the hopper bar feeder and chain assembly.

(2) Remove nuts (1) and remove hopper feeder foot shaft assembly from the paving machine.



1. Nut
2. Nut
3. Setscrew
4. Take-up
5. Take-up
6. Washer
7. Roller
8. Bearing
9. Collar
10. Shaft
11. Lubrication fitting

Figure 3-69. Hopper feeder foot shaft assembly.

b. Disassembly.

(1) Loosen nut (2) and remove setscrew (3). Remove take-ups (4 and 5) and washer (6).

(2) Remove rollers (7) and bearing (8) from shaft. Loosen setscrew in collar and remove collar (9) from shaft (10). Remove lubrication fitting (11) from shaft.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect shaft for cracks, breaks, scoring, or excessive wear.

(3) Inspect bearings and rollers for cracks, breaks, scoring, or excessive wear.

(4) Replace defective parts as necessary.

d. Reassembly.

(1) Install lubrication fittings (11) in shaft (10). Install collar (9) on shaft and tighten setscrews. Install bearing (8) and roller (7) on shaft.

(2) Install washer (6) and take-ups (5 and 4). Install setscrew (3) in take-up (4) and tighten nut (2).

e. Installation.

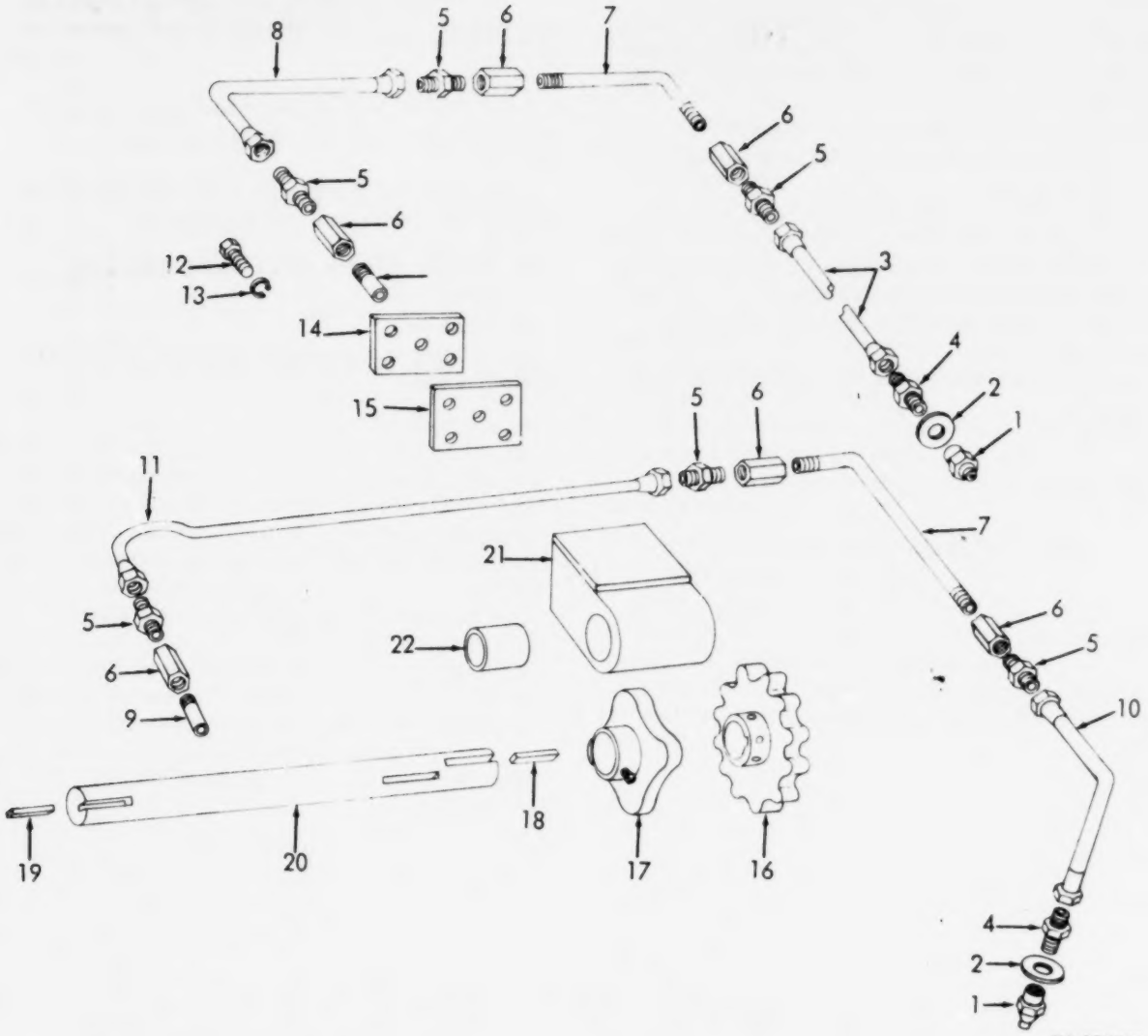
(1) Install hopper feeder foot shaft assembly on the paving machine. Install and tighten nuts (1).

(2) Refer to paragraph 3-44 and install the hopper bar feeder and chain assembly.

3-48. Hopper Feeder Head Shaft Assembly (Fig. 3-70)

a. Removal.

(1) Refer to paragraph 3-23 and remove the leveling arms.



1. Lubrication fitting
2. Flatwasher
3. Piping
4. Connector
5. Adapter
6. Connector
7. Piping
8. Piping
9. Pipe
10. Piping
11. Piping
12. Bolt
13. Lockwasher
14. Shim
15. Shim
16. Sprocket
17. Sprocket
18. Key
19. Key
20. Shaft
21. Bearing hub
22. Bearing

Figure 3-70. Hopper feeder head shaft.

(2) Use a suitable lifting device and move screed unit away from the paving machine.

(3) Refer to paragraph 3-46 and uncouple the feeder drive chain.

(4) Remove lubrication fittings (1), flatwasher (2), piping (3), connector (4), adapter (5), connector (6), piping (7 and 8), and pipe (9).

(5) Remove piping (10) and pipe (11). Remove bolt (12), lockwasher (13), and remove hopper feeder head shaft assembly. Remove shims (14 and 15).

b. Disassembly.

(1) Remove sprockets (16 and 17) and keys (18 and 19) from shaft (20).

(2) Remove bearing hub (21) from shaft (20). Use a suitable press and remove bearing (22) from bearing hub.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect shaft for cracks, breaks, scoring, or excessive wear.

(3) Inspect sprockets for cracks, breaks, and chipped, or missing teeth.

(4) Inspect bearings for cracks, breaks, scoring, or excessive wear.

(5) Replace defective parts as necessary.

d. Reassembly.

(1) Press bearing (22) into bearing hub (21). Install bearing hub (21) onto shaft (20).

(2) Install keys (19 and 18) and sprockets (17 and 16) into shaft.

e. Installation.

(1) Install assembled shaft assembly on the paving machine.

(2) Install shims (15 and 14) and secure shaft assembly to the paving machine with lockwasher (13) and bolts (12). Install pipe (11) and (10).

(3) Install pipe (9), piping (8 and 7), connector (6), adapter (5), connector (4), piping (3), flatwasher (2), and lubrication fitting (1).

(4) Refer to paragraph 3-46 and couple the feeder drive chain.

(5) Use a suitable lifting device and install the screed unit.

(6) Refer to paragraph 3-23 and install the leveling arms.

3-49. Feeder and Screw Counter Shaft Assembly (Fig. 3-71)

a. Removal.

(1) Remove deck plates on main frame to gain access to shaft.

(2) Refer to paragraph 3-46 and uncouple screw conveyor drive chain.

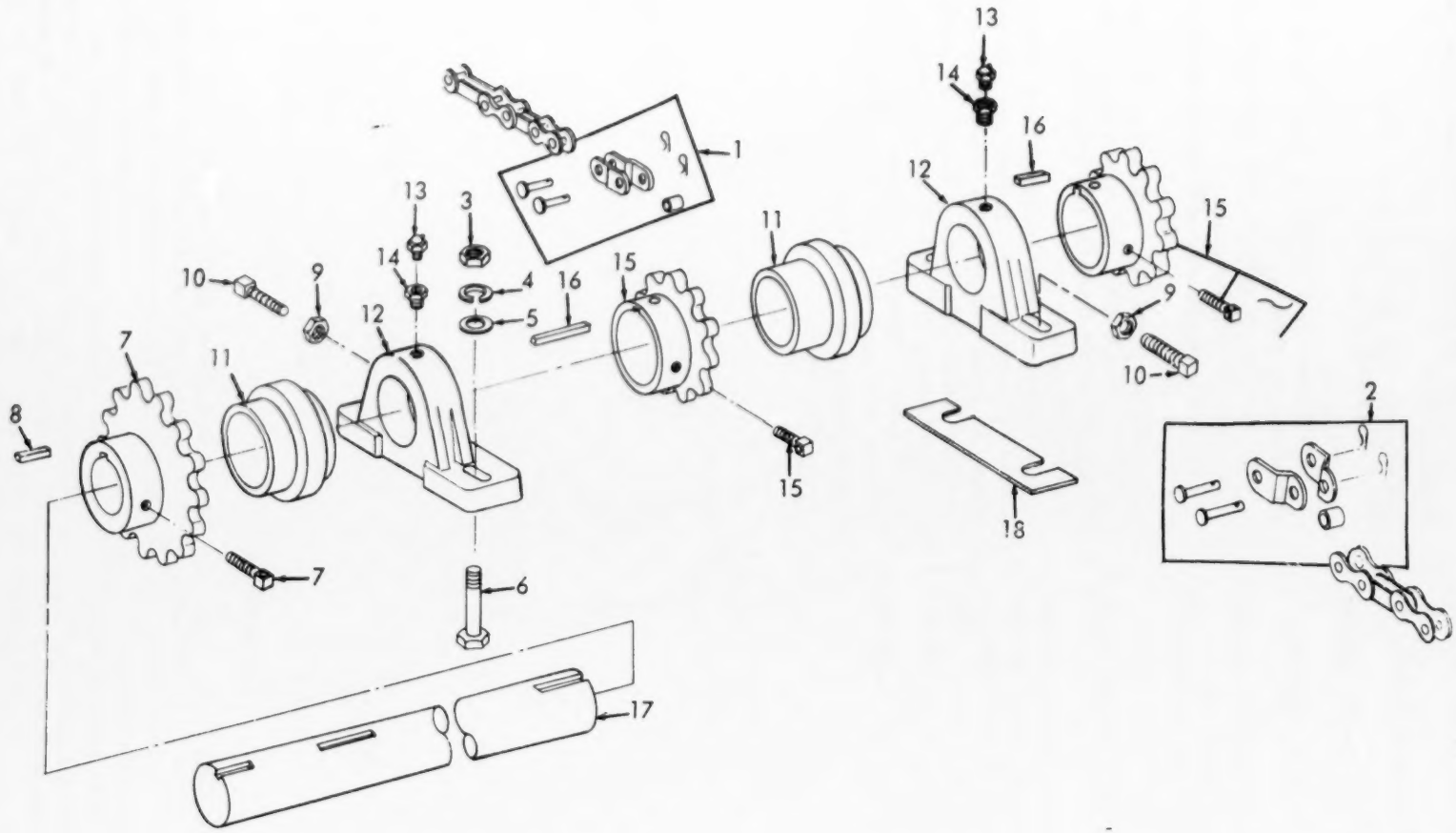
(3) Uncouple and remove chain assemblies (1 and 2).

(4) Remove nut (3), lockwasher (4), flatwasher (5), and screw (6) and remove countershaft assembly from the paving machine.

b. Disassembly.

(1) Loosen sprocket setscrew and remove sprocket (7) and key (8). Loosen nut (9) and remove setscrew (10), bearing insert (11), and bearing assembly (12). Remove lubrication fitting (13) and bushing (14) from bearing assembly.

(2) Loosen sprocket setscrew and remove sprocket (15) and key (16) from shaft (17). Remove bearing assembly shims (18).



1. Chain assembly
2. Chain assembly
3. Nut
4. Lockwasher
5. Flatwasher
6. Screw
7. Sprocket
8. Key
9. Nut
10. Setscrew
11. Bearing insert
12. Bearing assembly
13. Lubrication fitting
14. Bushing
15. Support
16. Key
17. Shaft
18. Shim

Figure 3-71. Feeder and screw counter shaft.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with a cleaning solvent and dry thoroughly.

(2) Inspect sprockets for cracks, breaks, and chipped or missing teeth.

(3) Inspect shaft for cracks, breaks, scoring, or excessive wear.

(4) Inspect bearing assembly for cracks, breaks, scoring, or excessive wear.

(5) Replace defective parts as necessary.

d. Reassembly.

(1) Install key (16) and sprocket (15) on shaft (17), and tighten sprocket setscrew. Install bushing (14) and lubrication fitting (13) on bearing assembly (12).

(2) Install bearing assembly (12) and bearing insert (11) on shaft. Install and tighten setscrew (10) and nut (9). Install key (8) and sprocket (7) on shaft and tighten sprocket setscrew.

e. Installation.

(1) Place shim (18) on paving machine frame and install countershaft assembly. Secure bearing assemblies to frame with screws (6), flatwashers (5), lockwashers (4), and nuts (3).

(2) Install and couple chain assemblies (2 and 1).

(3) Refer to paragraph 3-46 and couple screw conveyor drive chain.

(4) Install deck plates on main frame over countershaft.

3-50. Feeder Screw Clutch Assembly (Fig. 3-72)

a. Removal.

(1) Refer to paragraph 3-24 and remove crawler drive shaft couplings.

(2) Refer to paragraph 3-49 and remove feeder screw drive chains.

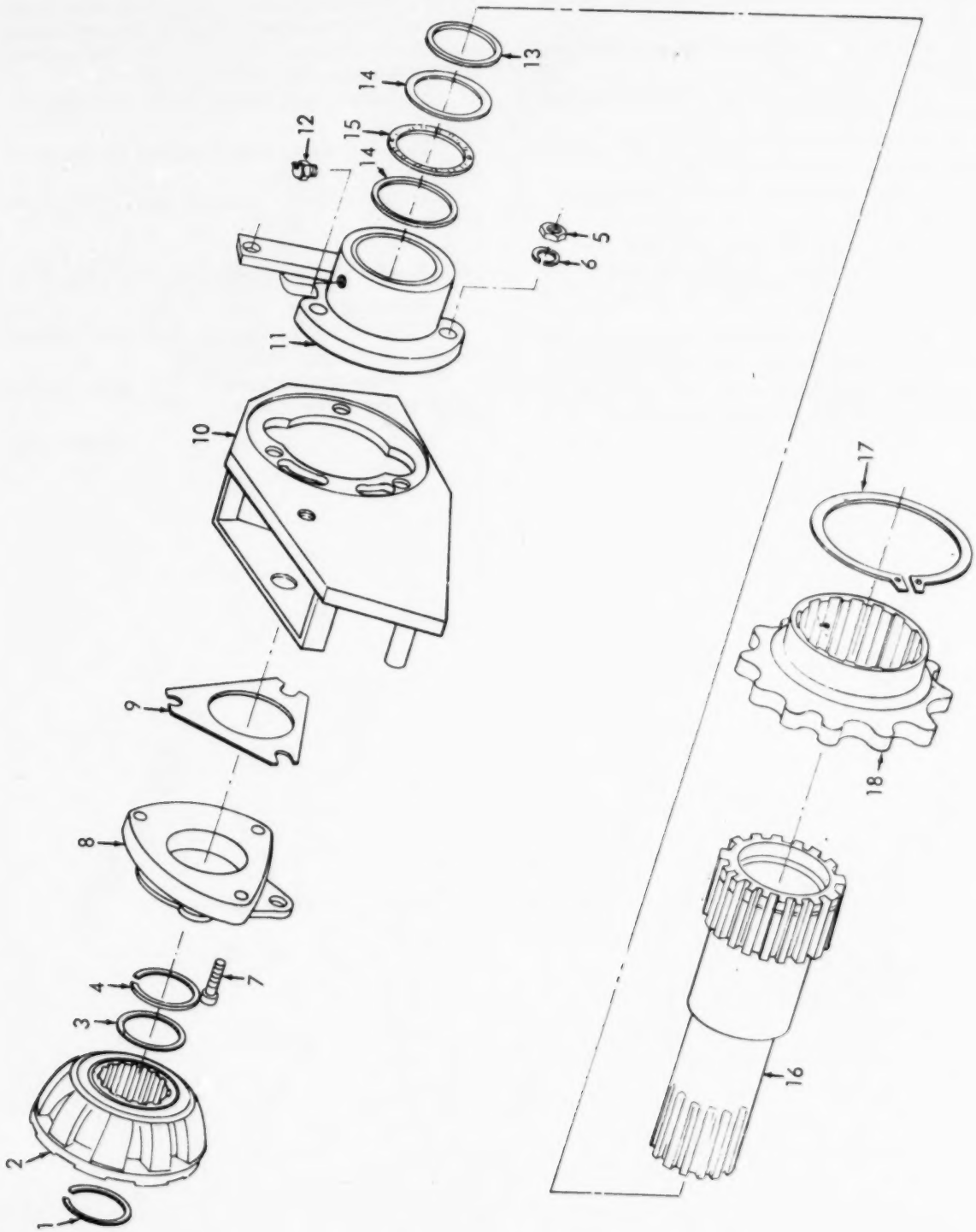


Figure 3-72. Feeder screw clutch assembly.

KEY for figure 3-72.

1. Retaining ring
2. Clutch
3. Shim
4. Retaining ring
5. Nut
6. Lockwasher
7. Screw
8. Release assembly
9. Shim
10. Clutch plate
11. Clutch hub
12. Lubrication fitting
13. Seal
14. Thrust washer
15. Retainer and rollers
16. Shaft
17. Retaining ring
18. Sprocket

(3) Remove deck plates on main frame to gain access to clutch.

(4) Refer to paragraph 3-24 and remove crawler drive shaft couplings.

(5) Refer to paragraph 3-41 and disconnect clutch controls.

(6) Remove retaining ring (1), clutch (2), and shim (3). Remove retaining ring (4), nut (5), lockwasher (6), screw (7), and release assembly (8).

(7) Remove shim (9), clutch plate (10), and clutch hub (11). Remove lubrication fitting (12) from clutch hub.

(8) Remove seal (13), thrust washer (14), retainer and rollers (15), and shaft (16). Remove retaining ring (17) and sprocket (18) from shaft.

b. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect clutch assembly for cracked or broken housing and missing hardware.

(3) Inspect bearings for cracks, breaks, and excessive wear.

c. Installation.

(1) Install sprocket (18) on shaft (16), and install retaining ring (17). Install assembled shaft on the paving machine.

(2) Install thrust washer (14), retainer and roller (15), and seal (13) in clutch hub (11). Install lubrication fitting (12) in clutch hub.

(3) Install clutch hub (12), clutch plate (10), shim (9), and release assembly (8) on shaft (16), and install retaining ring (4). Secure release assembly (8) to clutch plate with screw (7), lockwasher (6), and nut (5).

(4) Install shim (3), clutch (2), and install retaining ring (1).

Section XI. SCREED UNIT ASSEMBLY

3-51. General

The screed unit assembly includes the leveling arms which fasten to and pivot on the crawlers. The screed unit consists of the tamper drive, tamper eccentric shafts, tamper deflectors, thickness control, crown control, screed frames, and screed plates.

3-52. Screed Deflector Plates (Fig. 3-73)

a. Removal.

(1) Refer to paragraph 3-23 and remove the leveling arms.

(2) Use a suitable lifting device and move the screed unit away from the paving machine.

(3) Remove nut (1), lockwasher (2), screw (3), rod end (4), nut (5), bolt (6), nut (7), and rod end (8).

(4) Remove nut (9), lockwasher (10), bolt (11), and remove deflector plates (12 and 13) from the screed unit.

b. Disassembly.

(1) Remove nut (14), lockwasher (15), screw (16), flatwasher (17), and bracket (18), from deflector plate.

(2) Remove nut (19), lockwasher (20), screw (21), and deflector blades (22 and 23) from deflector plates.

(3) Remove nut (24), lockwasher (25), screw (26), flatwasher (27), and bracket (28), from screed frame.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect deflector plates and blades for cracks, breaks, or excessive wear.

(3) Replace parts as necessary.

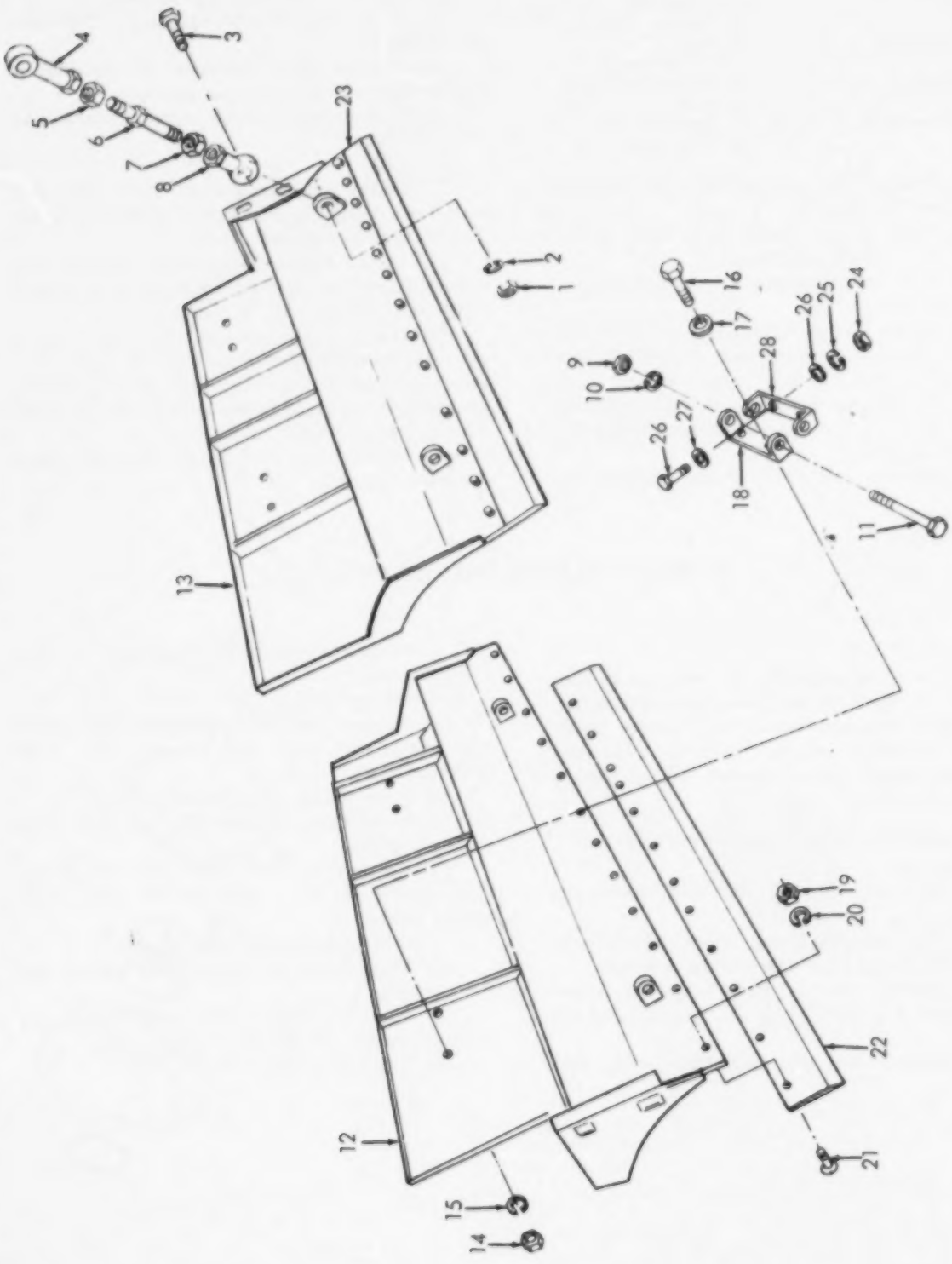


Figure 3-73. Screed deflector plates.

KEY for figure 3-73.

1. Nut
2. Lockwasher
3. Screw
4. Rod end
5. Nut
6. Bolt
7. Nut
8. Rod end
9. Nut
10. Lockwasher
11. Bolt
12. Deflector plate
13. Deflector plate
14. Nut
15. Lockwasher
16. Screw
17. Flatwasher
18. Bracket
19. Nut
20. Lockwasher
21. Screw
22. Deflector blade
23. Deflector blade
24. Nut
25. Lockwasher
26. Screw
27. Flatwasher
28. Bracket

d. Reassembly.

(1) Install bracket (28) on screed frame and secure with flatwasher (27), screw (26), lockwasher (25), and nut (24).

(2) Install deflector blades (23 and 22) on deflector plates (12 and 13) and secure with screw (21), lockwasher (20), and nut (19).

(3) Install bracket (18) on deflector plates and secure with flatwasher (17), screw (16), lockwasher (15), and nut (14).

e. Installation.

(1) Install deflector plates (13 and 12), on screed unit and secure with bolt (11), lockwasher (10), and nut (9).

(2) Assemble rod end (8), nut (7), bolt (6), nut (5), and rod end (4). Install assembled rod on the deflector plates and secure with screw (3), lockwasher (2), and nut (1).

(3) Use a suitable lifting device and install the screed unit on the paving machine.

(4) Refer to paragraph 3-23 and install the leveling arms.

3-53. Screed Tamper and Shaft (Fig. 3-74)

a. Removal.

(1) Remove belt guard and release tension on V-belts and remove V-belts from hydraulic motor drive pulley.

(2) Remove nut (1) and stop bolt (2) in upper wedge block (3).

(3) Loosen setscrew (4) and slide hub (5) over to release tension on spring (6). Disconnect Lubrication hose that runs to tamper connecting shaft.

(4) Remove nut (7) and screw (8) from eccentric arms and remove shaft (9).

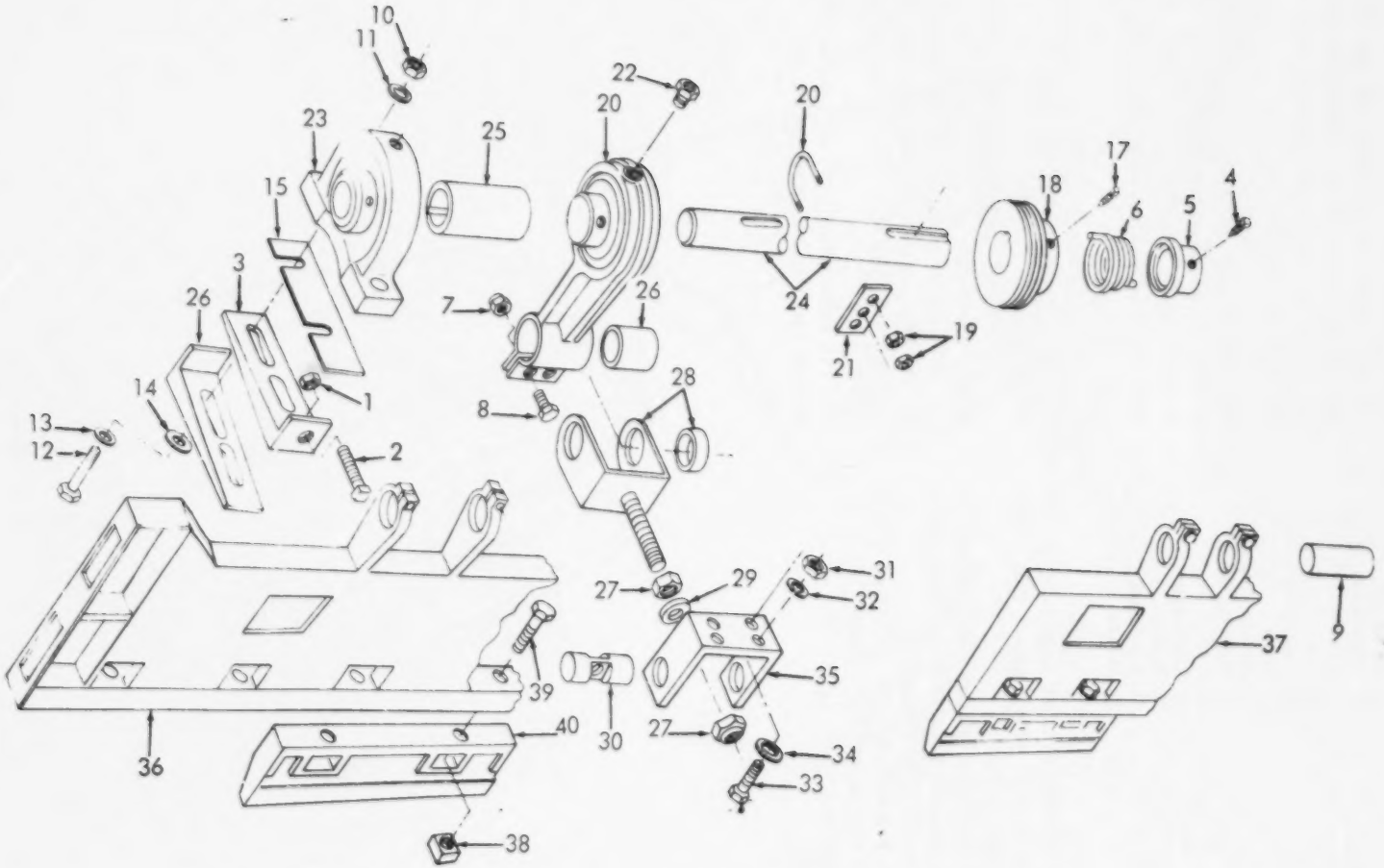


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Figure 3-74. Screed tamper and shaft.

KEY for figure 3-74.

1. Nut
2. Stop bolt
3. Wedge block
4. Setscrew
5. Hub
6. Spring
7. Nut
8. Screw
9. Shaft
10. Nut
11. Flatwasher
12. Screw
13. Flatwasher
14. Flatwasher
15. Shim
16. Wedge block
17. Setscrew
18. Pulley
19. Nut
20. U-bolt
21. Counterweight
22. Eccentric arm
23. Bearing unit
24. Shaft
25. Bearing insert
26. Sleeve bearing
27. Nut
28. Yoke
29. Collar
30. Pin
31. Nut
32. Lockwasher
33. Screw
34. Flatwasher
35. Yoke support
36. Tamper frames
37. Tamper frames
38. Nut
39. Screw
40. Tamper bar

(5) Remove nut (10), flatwasher (11), screw (12), and flatwasher (13 and 14). Tamper eccentric shaft assembly is now free for removal. Remove shim (15) and wedge blocks (3 and 16) from screed unit frame.

CAUTION

Watch spring (6) connecting the two eccentric shafts when removing shafts first as it may still be under tension and may jump out as shaft is removed.

b. Disassembly.

(1) Remove hub (5) and spring (6) from shaft. Loosen setscrew (17) and remove pulley (18).

(2) Remove nut (19), U-bolt (20), and counterweight (21), from shaft. Remove eccentric arm (22) and bearing unit (23) from shaft (24). Remove bearing, insert (25), from bearing unit. Remove sleeve bearing (26) from eccentric arm.

(3) Remove nut (27), eccentric arm yoke (28), collar (29), and pin (30). Remove nut (31), lockwasher (32), screw (33), flatwasher (34), and yoke support (35), from screed unit frame.

(4) Remove tamper frames (36 and 37) from the screed unit. Remove nut (38), screw (39), and tamper bar (40), from the tamper frames.

c. Cleaning, Inspection and Repair.

(1) Clean all parts with a cleaning solvent and dry thoroughly.

(2) Inspect all mounting hardware for cracks, breaks, damaged threads or other damage. Repair or replace damaged mounting hardware.

(3) Inspect bearings for cracks, breaks, excessive wear, blown grease seals, or other damage. Replace a damaged or defective bearing.

(4) Inspect shafts for cracks, breaks, scoring, burs, or signs of wear. Replace a worn or defective shaft.

(5) Inspect tamper frame shafts, bushings, and collars for breaks, cracks, excessive wear, or other damage. Replace defective or damaged parts.

(6) Inspect drive sheave and drive hub that mate with connecting spring. Inspect connecting spring carefully. Inspect for cracks, breaks, excessive wear, or other damage. Repair or replace damaged or defective parts.

d. Reassembly.

(1) Install tamper bar (40) on tamper frames (37 and 36) and secure with screw (39) and nut (38). Install assembled tamper frames on the screed unit.

(2) Install yoke support (35), on screed unit frame and secure with flatwasher (34), screw (33), lockwasher (32), and nut (31). Install pin (30), collar (29), eccentric arm yoke (28), and nut (27).

(3) Install sleeve bearing (26) in eccentric arm and install bearing insert (25) in bearing unit. Install bearing unit (23), and eccentric arm (22) on shaft (24). Install counterweight (21) on shaft and secure with U-bolt (20) and nut (19).

(4) Install pulley (18) and hub (5) on shaft (24).

e. Installation.

(1) Install wedge blocks (16 and 3) and shims (15) on screed unit frame. Place eccentric shaft assemblies in their proper position on screed unit with V-belts on drive sheave. Install a compressed and wired spring (6). If the replacement spring is not wired in its compressed position, put spring in a vise and compress it completely. Wrap several turns of No. 20 or No. 18 iron wire around the spring at three evenly spaced points.

WARNING

Be sure the jaws of the vise are square, as this spring when fully compressed develops about 600 lbs. pressure and could cause considerable damage if it slips out of the vise under pressure. Do not clip the binding wires until the spring, pulley, and hub are in place.

(2) Secure eccentric shaft assemblies to screed frame with flatwashers (14 and 13), screw (12), flatwasher (11), and nut (10).

(3) Install shaft (9) that connects eccentric arms to tamper plates and screw (8) and nut (7) in eccentric arms.

(4) Bring the spring drive hub (5) back to its proper place on the shaft, then enter prong of spring into hole of hub. Tighten hub setscrews (4) to hold hub in place. Move pulley on the other

tamper shaft into place and tighten down setscrew (17).

(5) Align hole in pulley for prong to enter. Hold the spring in place with a flat piece of wood so that when wires are cut the prongs on each end of the spring will enter the holes in the pulley and hub. Carefully cut the wires holding the spring compressed. If the spring moves when cutting the wires, it may be necessary to use a small bar to force the spring prongs into place.

(6) Install stop bolt (2) and nut (1) in upper wedge block (3).

3-54. Thickness Control Assembly (Fig. 3-75)

a. Removal.

(1) Refer to paragraph 3-23 and remove leveling arms.

(2) Remove shafts (1 and 2) and thickness control assembly from the screed unit.

KEY for figure 3-75

1. Shaft
2. Shaft
3. Spring
4. Cotter pin
5. Pin
6. Lock
7. Rivet
8. Pedal
9. Pedal
10. Grip
11. Nut
12. Lockwasher
13. Screw
14. Hand control
15. Dial
16. Nut
17. Lockwasher
18. Screw
19. Level gage
20. Pin
21. Collar
22. Ball bearing
23. Setscrew
24. Adjusting screw
25. Cotter pin
26. Nut
27. Clevis
28. Stop
29. Ball bearing
30. Yoke
31. Yoke

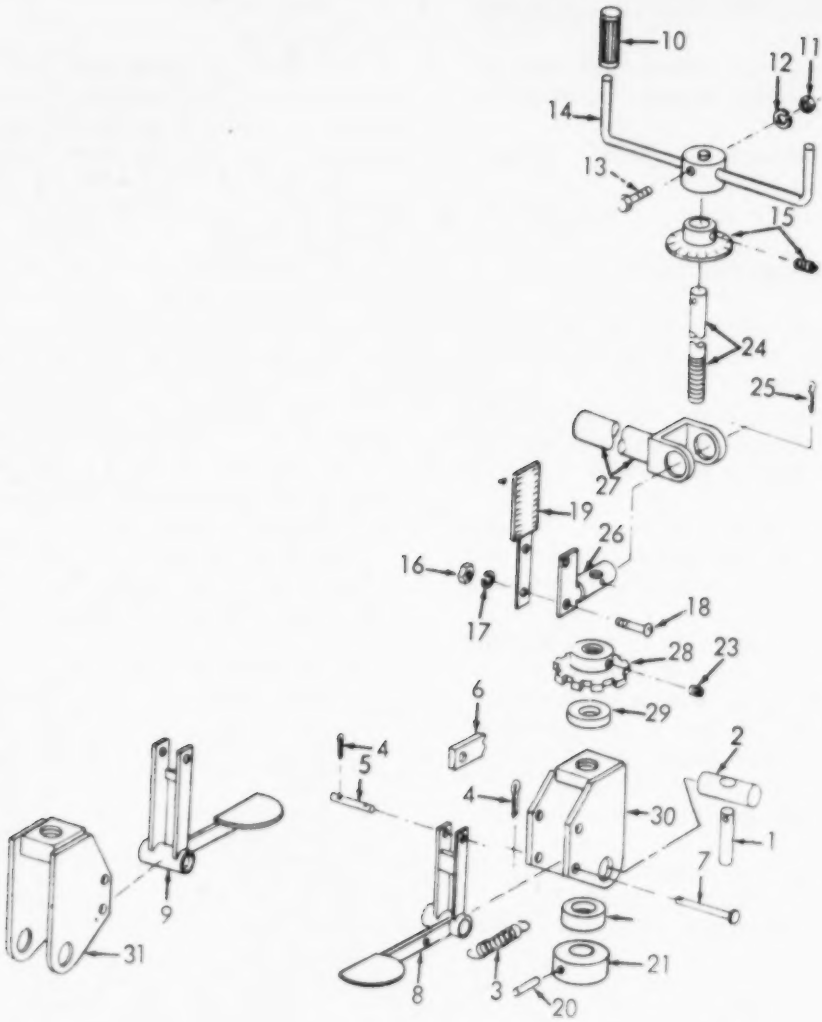

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Figure 3-75. Thickness control assembly.

b. Disassembly.

(1) Remove spring (3), cotter pins (4), pin 5), lock (6), rivet (7), and pedals (8 and 9).

(2) Remove grip (10), nut (11), lockwasher 12), screw (13), and hand control (14), from djusting shaft.

(3) Loosen dial setscrew and remove dial (15). Remove nut (16), lockwasher (17), screw (18), and level gage (19).

(4) Remove pin (20), collar (21), and ball bearing (22), from adjusting screw. Remove stop setscrew (23) and remove adjusting screw (24).

(5) Remove cotter pin (25), nut (26), clevis (27), stop (28), ball bearing (29), and yokes (30 and 31).

c. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect adjusting screw and nut for damaged threads, cracks, breaks, or excessive wear.

(3) Inspect bearings for cracks, breaks, scoring, or excessive wear.

(4) Inspect yoke for cracks, breaks, or excessive wear.

(5) Replace all defective parts.

d. Reassembly.

(1) Position ball bearing (29) and stop (28) on yokes (30 and 31). Install nut (26) in yoke (27) and secure with cotter pin (25).

(2) Screw adjusting screw (24) through nut (26) and stop (28). Install and tighten stop setscrew (23). Install bearing (22), collar (21), and pin (20).

(3) Install level gage (19) on nut (26) and secure with screw (18), lockwasher (17), and nut (16). Install dial (15) on adjusting screw and tighten setscrew.

(4) Install hand control (14) on adjusting screw and secure with screw (13), lockwasher (12), and nut (11). Install grip (10) on hand control.

(5) Install pedals (9 and 8) on yokes and secure with rivet (7) and cotter pin (4). Install lock (6) on pedals and secure with pin (5) and cotter pin (4). Install spring (3) on pedals.

e. Installation.

(1) Install thickness control assembly on screed unit and secure with shafts (1 and 2).

(2) Refer to paragraph 3-23 and install leveling arms.

3-55. Screed Frame and Crown Adjustment (Fig. 3-76)

a. Removal.

(1) Refer to paragraph 3-23 and remove leveling arms. Use a suitable lifting device. Move screed unit away from the paving machine and support screed unit on wood blocks.

(2) Refer to TM 5-3895-275-12, and remove screed lower step, burner piping and valve, and hydraulic motor.

(3) Refer to paragraphs 3-36, through 3-38, 3-51 through 3-54 and remove components from the screed unit.

(4) Uncouple and remove crown adjusting chain (1). Remove nut (2) and loosen nut (3). Turn these nuts back along with sprockets (4). Screw (5) will come out in direction of welded end.

(5) Remove collar (6), spacer blocks (7), bearing (8), sprockets (4), and nuts (3). Remove nuts (9) and tie rod (10).

(6) Remove nuts (11 and 12), collar (13), clamps (14), crown control bolt (15), keeper bar (16), and frame supports (17 and 18).

KEY for figure 3-76.

1. Chain
2. Nut
3. Nut
4. Sprocket
5. Screw
6. Collar
7. Spacer blocks
8. Bearing
9. Nut
10. Tie rod
11. Nut
12. Nut
13. Collar
14. Clamp
15. Bolt
16. Keeper bar
17. Frame support
18. Frame support
19. Nut
20. Flatwasher
21. Screed frame
22. Screed frame
23. Screed plate
24. Screed plate

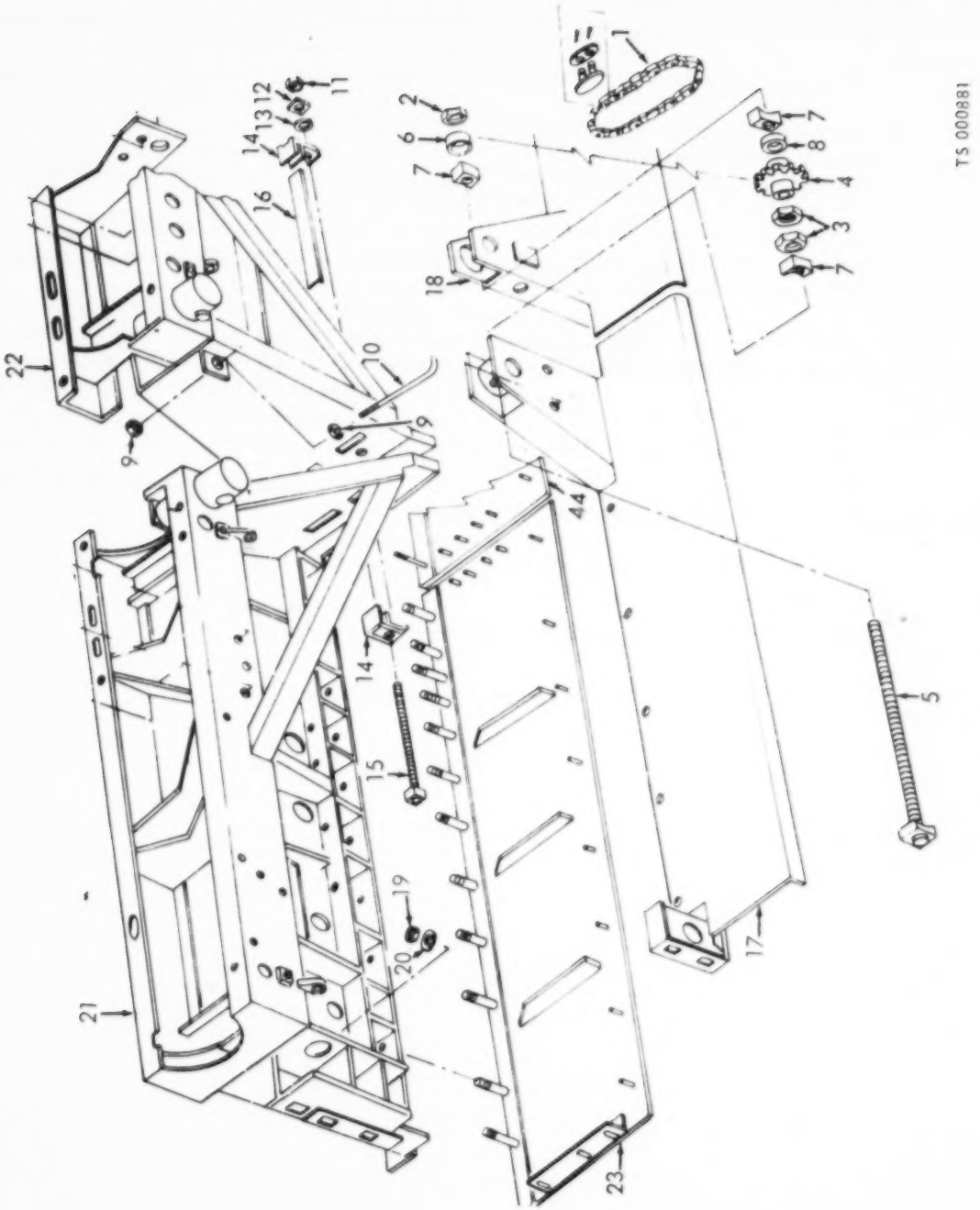

Figure 3-76. Screed frame and crown adjustment.

(7) Remove nuts (19) and flatwashers (20) and remove screed frames (21 and 22) from screed plates (23 and 24).

b. Cleaning, Inspection and Repair.

(1) Clean all parts with cleaning solvent and dry thoroughly.

(2) Inspect bearings for cracks, breaks, scoring, or excessive wear.

(3) Inspect sprocket assembly for cracks, breaks, and chipped or missing teeth.

(4) Inspect chain for cracks, breaks, or excessive wear.

(5) Inspect screed frame and plates for cracks, breaks, warpage, or distortion.

(6) Replace defective parts as necessary.

c. Installation.

(1) Install screed frames (21 and 22) on screed plates and secure with flatwashers (20) and nuts (19).

(2) Install frame supports (18 and 17), keeper bar (16), crown control bolt (15), clamps (14), collar (13), and nuts (12 and 11).

(3) Install tie rod (10) and nut (9). Position screw (5) in frame support. Install spacer block (7), nuts (3), sprocket (4), and bearing (8). Turn nuts (3) and sprocket (4) until screw is all the way in. Tighten nuts (3) and install spacer block (7), collar (6), and nut (2). Install and couple crown adjusting chain (1) on sprockets.

(4) Refer to paragraphs 3-36 through 3-38, 3-51 through 3-54 and install screed unit components.

(5) Refer to TM 5-3895-275-12, and install screed lower step, burner piping and valve, and hydraulic motor.

(6) Use a suitable lifting device and install screed unit on the paving machine. Refer to paragraph 3-23 and install the leveling arms.

(7) Refer to TM 5-3895-275-12, paragraph 2-5, and adjust crown.

APPENDIX A

REFERENCES

A-1. Lubrication

LO 5-3895-275-12	Lubrication Order for Paving Machine, Crawler Mounted, 8 to 12 Foot Wide, Barber-Greene Model SA-35
TB 703-1	Specification List of Standard Liquid Fuels, Lubricants, Preservatives, and Related Products Authorized for Use by U.S. Army

A-2. MAINTENANCE

TB 750-651	Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems.
TM 38-750	Army Equipment Record Procedures
TM 5-764	Electric Motor and Generator Repair
TM 5-3895-275-34P	Direct and General Support Maintenance, Repair Parts and Special Tool List for Paving Machine
TM 9-6140-200-14	Lead-Acid Batteries
TM 10-450	Sheet Metal Work, Body, Fender, and Radiator Repair

A-3. SHIPMENT AND STORAGE

TM 38-230-2	Preservation, Packaging, and Packing of Military Supplies and Equipment (Packing)
TM 740-90-1	Administrative Storage of Equipment

A-4. DESTRUCTION OF MATERIAL

TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use

A-5. PAINTING

TM 9-213	Painting Instructions for Field Use

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By Order of the Secretary of the Army:

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Distribution:

To be distributed in accordance with DA Form 12-25B, (qty rqr block no. 435). Direct and General Support maintenance requirements for Distributors' Paver, Bituminous.

☆U.S. GOVERNMENT PRINTING OFFICE: 1989 - 242-451/05354

PIN : 005558-000